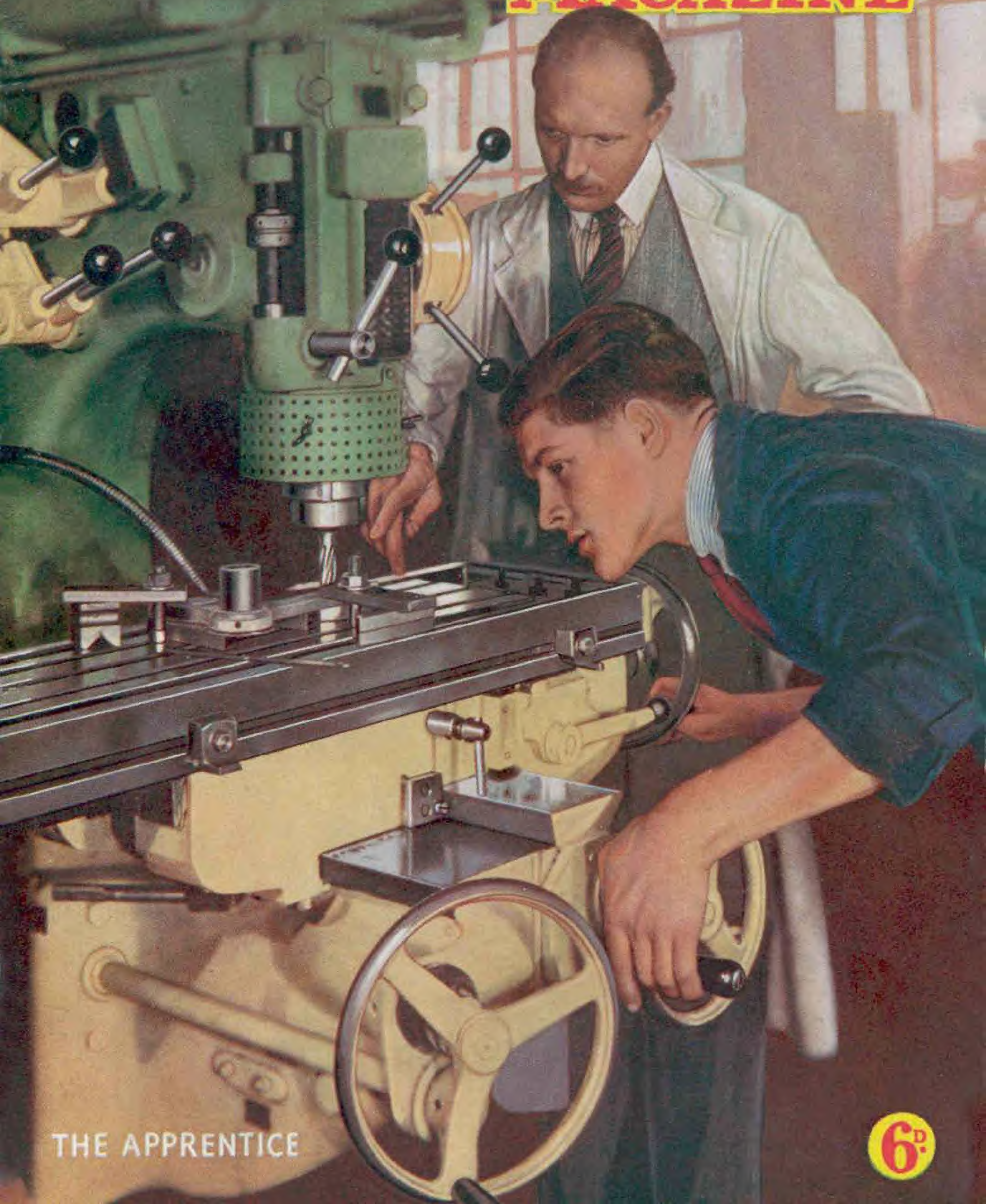


VOL. XXXII. No. 1

JANUARY 1947

MECCANO

MAGAZINE



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6^d

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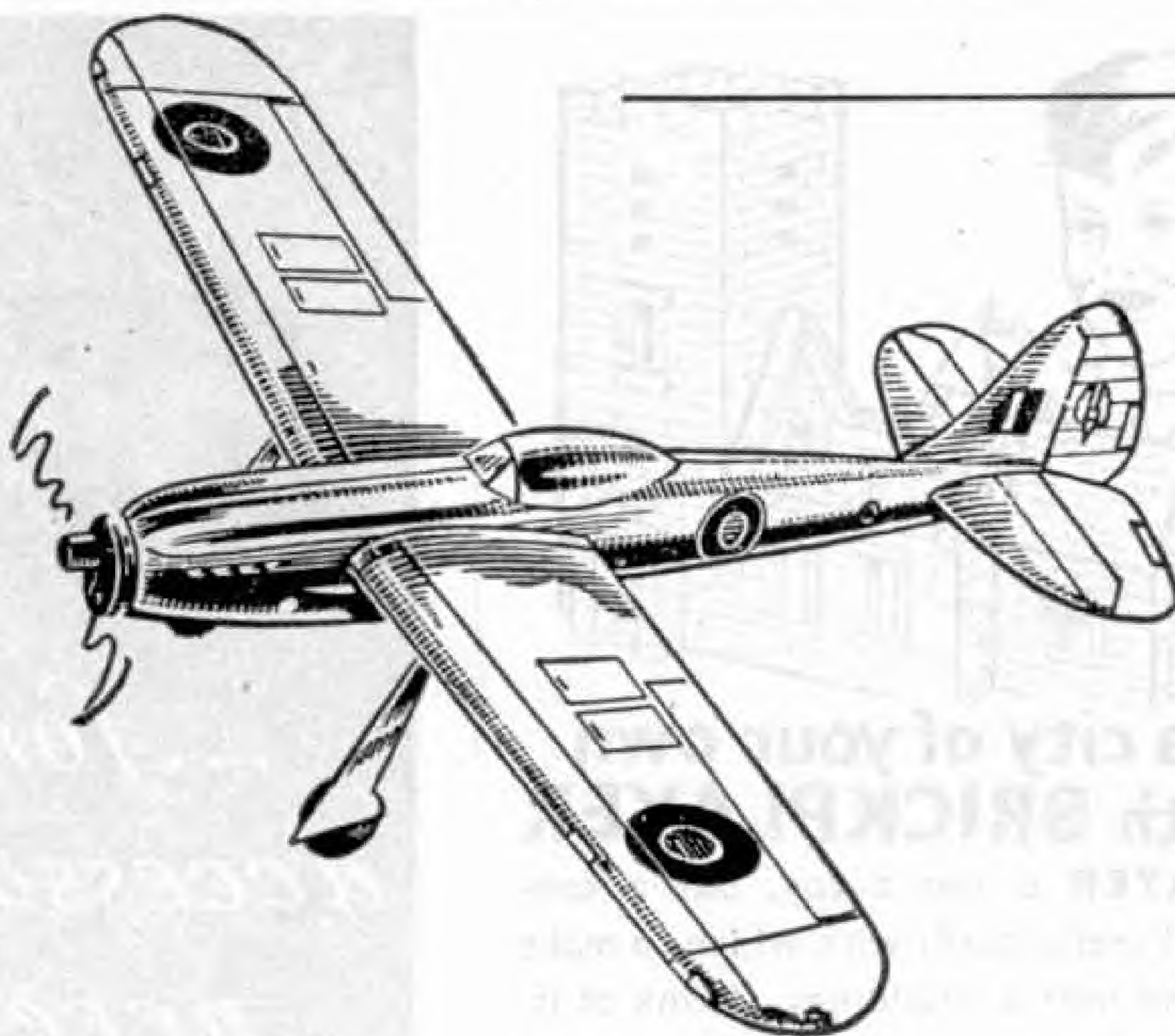
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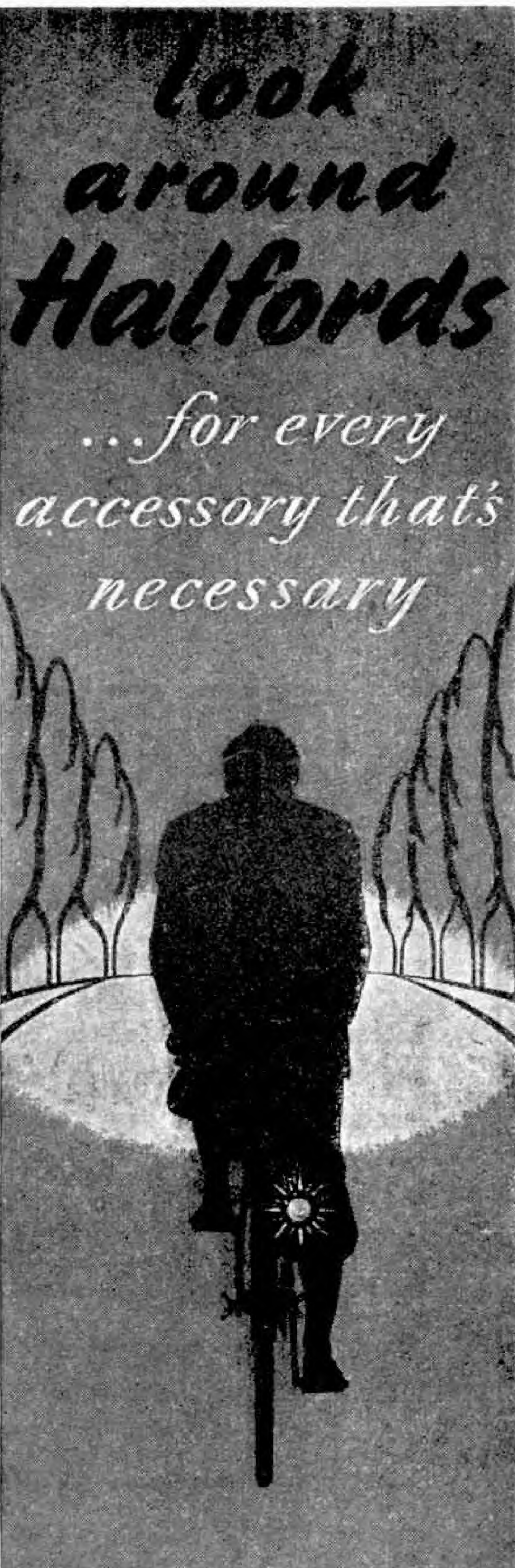
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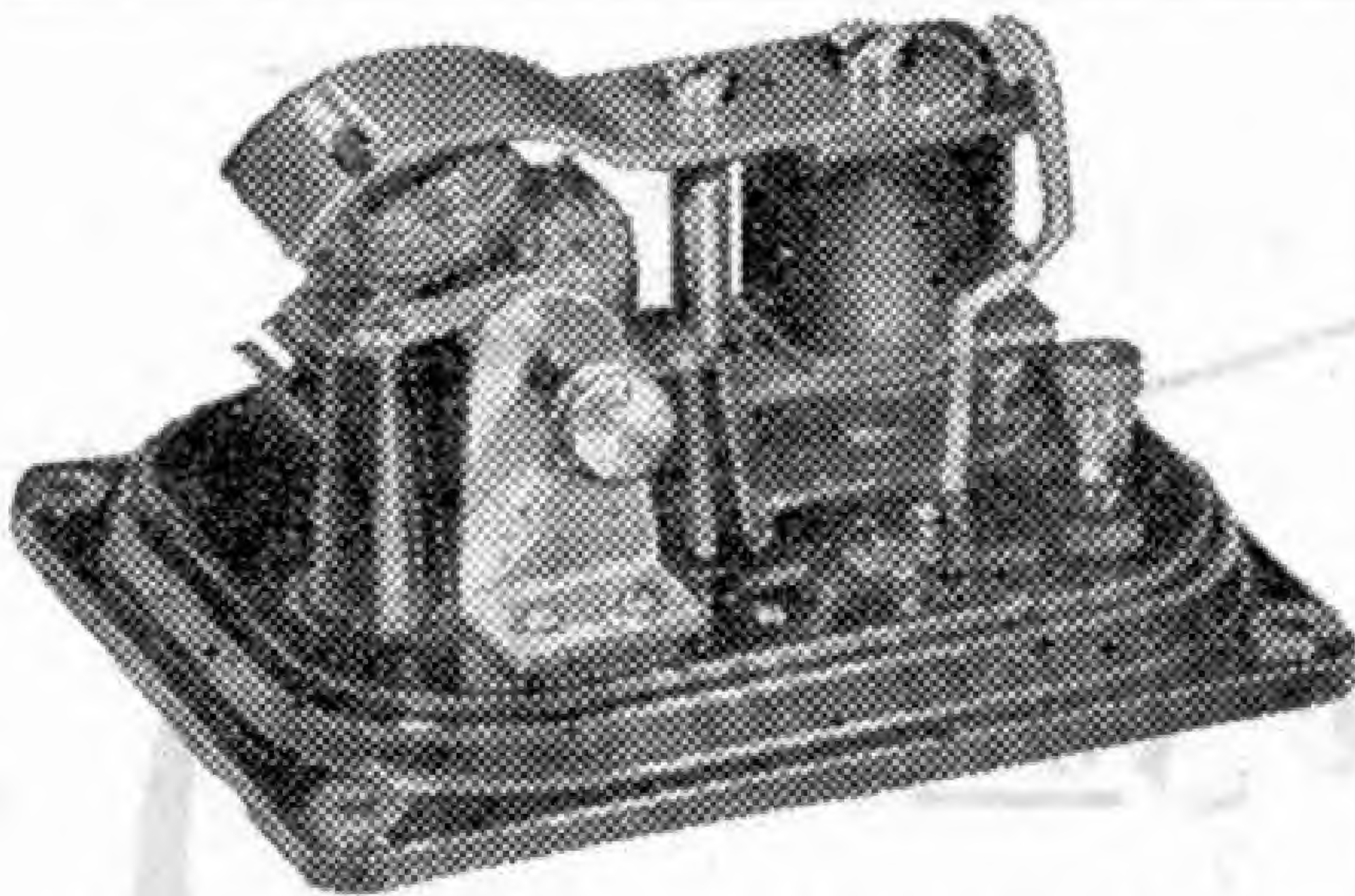


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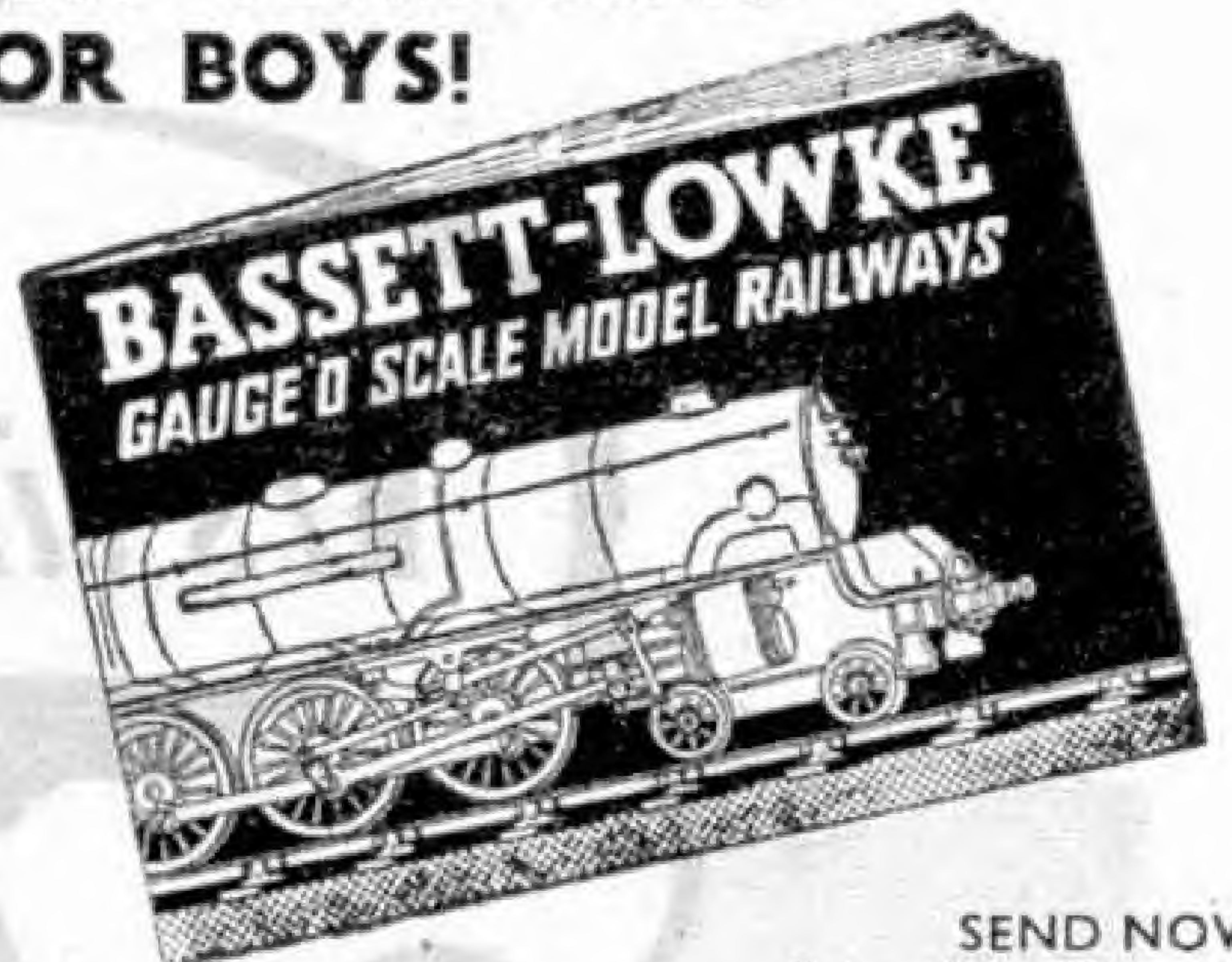
Binding cases for the 1946 "M.M." can be obtained from Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool 1. They are supplied in what is known as Quarter Basil, full cloth, and are tastefully embossed in gold with the name "Meccano Magazine." On the back is the name and volume number. Price 7/6 post free.

The binding cases are supplied so that readers can have their Magazines bound locally, but where desired the firm mentioned above will bind the twelve issues of the 1946 "Meccano Magazine" at a charge of 12/6, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted, as required.

These prices apply also to the volumes from 1942 to 1945 inclusive.

Binding cases for the larger size of the "M.M." prior to 1942 are still available, price 7/3 for 12 issues. The complete cost of binding this size is 15/- for 12 copies.

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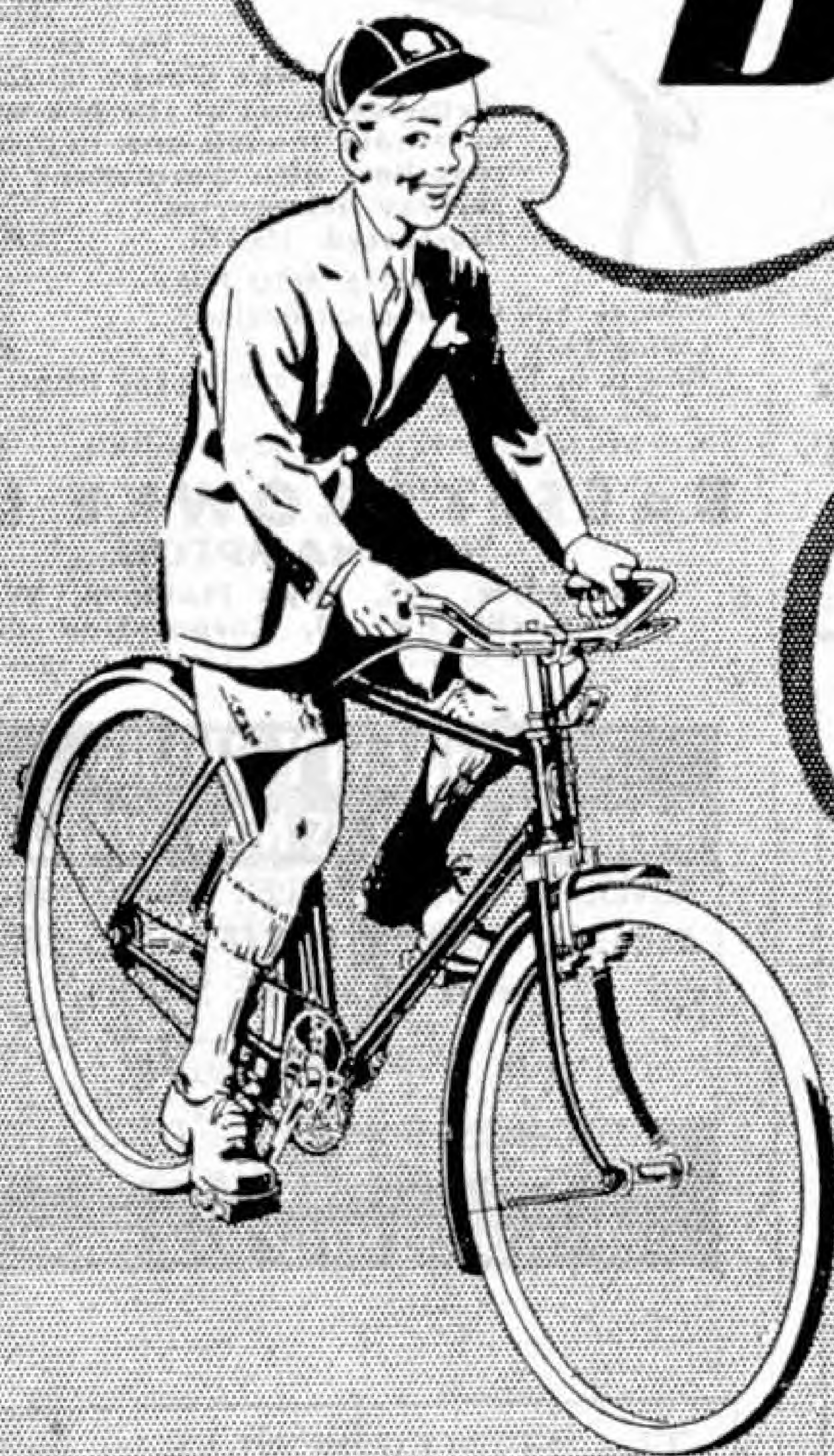
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MECCANO

MAGAZINE

Editorial Office:
Binns Road
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Vol. XXXII
No. 1
January 1947

With the Editor

A HAPPY NEW YEAR To Every Reader

Once again I have the pleasure of sending New Year good wishes to my readers. And this has set me thinking of the many parts of the world to which the "*Meccano Magazine*" travels month by month. The majority of copies go of course to readers in Great Britain, Northern Ireland and Eire, but large numbers go far and wide overseas. What a list it makes—Canada, Australia, New Zealand, South Africa, West Africa and East Africa, India, Malta, Mauritius, Hong-Kong, Singapore, Fiji, United States, France, Denmark, Iceland, Holland, Belgium, Portugal, Italy, Egypt, Palestine, Mexico, South America.

To every member of this world-wide family of readers, my Staff and I send our sincere wishes for health, happiness, and prosperity.

More Copies and More Pages!

I am glad to be able to open the year with two pieces of good news. In the first place, from this month onward there will be more copies of each issue, which means that more readers will be able to make sure of their copies by placing regular orders with their Meccano dealers or newsagents. I am afraid that even with this increase there will not be enough copies to satisfy all demands, but it does bring us nearer the day when there will be copies for all, as there were in the years before the war.

A second step forward is an increase in the number of pages in each issue. This is very welcome, although it still leaves the Magazine woefully small in comparison with its pre-war size. There will be more increases as soon as more paper is allowed. I cannot of course say when this will be, but I am sure that readers will continue

to be patient and to maintain the splendid support that they have given me during the difficult years through which we have passed.

The S.R. electrification scheme that I referred to last month has been followed by the announcement of a five year plan by the L.N.E.R. This plan aims at the restoration of pre-war standards of service and improvements based on modern design and scientific research, and provides for a total of 1,000 new locomotives, 5,500 carriages and 70,000 wagons. An article on this scheme will appear next month.

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A Railwayman Abroad, 1944-46

By D. S. Barrie, M.B.E.

CONDITIONS of railway travel in North-West Europe during the period 1944-46 were far removed from the pre-war speed and luxury associated with the Continental railways, and so interestingly recalled by my old friend R. A. H. Weight in a recent series of articles in the "M.M."; nevertheless, journeys over the railways of the Liberated Countries in wartime, and subsequently in Occupied Germany, were always full of interest for any railwayman or student of railways. They afforded, moreover, an insight into the remarkable achievements of the Allied technical troops and civil railwaymen in overcoming the legacies of German occupation—wrecked yards and bridges, damaged tracks, and acute shortage of locomotives, coaches and wagons, large numbers of which were withdrawn into Germany by the retreating enemy.

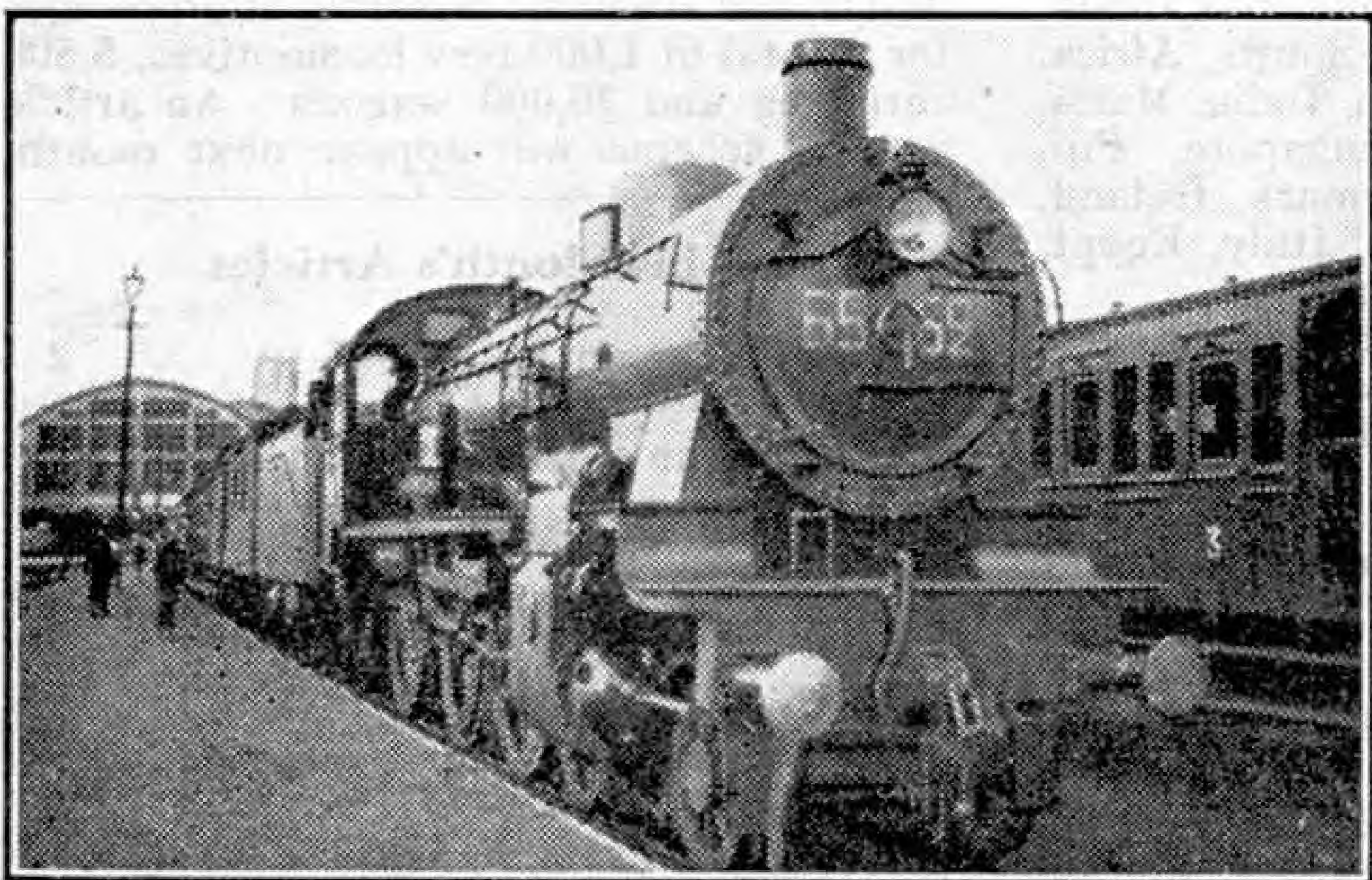
These shortages were particularly acute

employed by the French and Belgian railways, incidentally, included numerous 2-8-0 tender engines built in U.S.A. during and after the last war, and subsequently sold to France; while there were still to be seen in Belgium, struggling pluckily with loads beyond their capacity, the smaller American-built 2-6-0s and 2-6-2 saddle tanks of First World War origin. British manufacturers were also represented by the "31" class of 2-8-0 on the Belgian Railways, while as recently as February last year I saw an old Great Western "Dean Goods" 0-6-0 tender engine (War Department No. 172), of a type which has served on many fronts in two world wars, patiently shunting at Lille.

While primarily employed on freight duties, the W.D. British-built 2-8-0s were also used extensively on both military and civil passenger trains. The loads of the former, ranging up to 500 and 600

tons, were always heavy, but as the normal standard of running called for start-to-stop speeds in the vicinity of 30 m.p.h., with a maximum of 45-50 m.p.h., they were normally able to keep time readily enough despite much indifferent coal and the numerous disheartening slacks over temporary bridges, track diversions, and the other impedimenta of war-time operation.

One or two examples of the day-to-day work of the W.D. 2-8-0s may be of interest. With a light load of 12 Belgian coaches, mostly 4- and 6-wheelers, No.



A 4-6-0 locomotive of the Belgian State Railways, No. 6552, waiting to leave Ostend with a local train for Brussels.

during the winter of 1944, when, moreover, much of the equipment which the Germans had left behind was still awaiting repair of damage sustained in battle, air raids, or of normal wear-and-tear. As increasingly large numbers of British- and U.S.-built locomotives reached the theatre (principally the well-known 2-8-0 tender and 0-6-0 tank types) they were to be found working alongside the "native products" in the forward areas and along the lines of communication. Engines

78560 ran from near Ostend to Bruges, 12 miles in 19½ min. start-to-stop (average 36.5 m.p.h., maximum 49). From Bruges we passed Hansbeke, 17 miles in 24½ min., with an average of 47 m.p.h. maintained for 13¾ miles, after which permanent way delays supervened. On another occasion the same engine with 16 vehicles, 355 tons tare, ran from Ostend to Bruges, 14 miles in 28 min., and from Bruges passed Landegem, 18¾ miles, in 31 min. inclusive of a severe slack; the gradients

on this route are negligible.

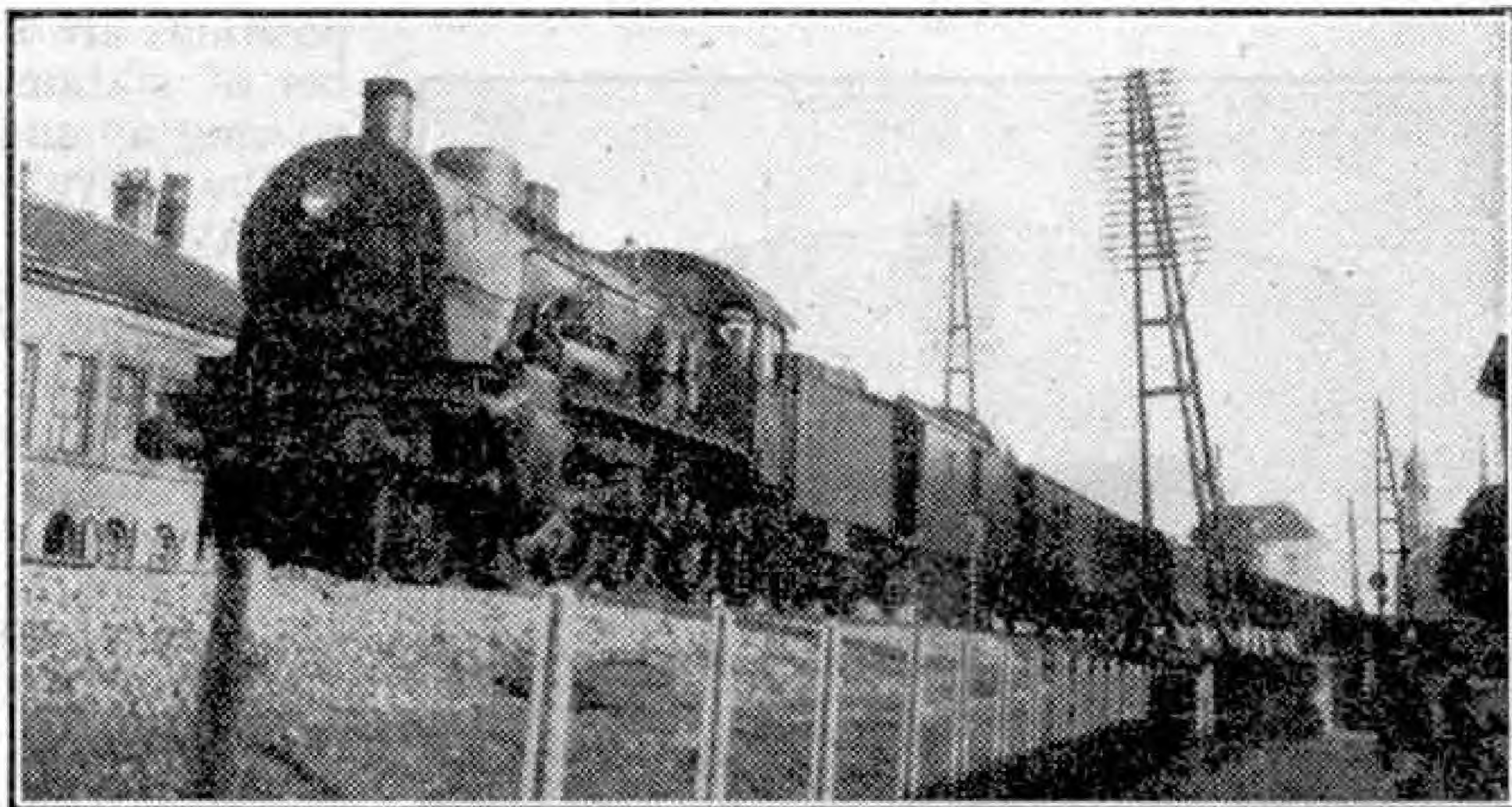
On the N.S. (Netherlands Railways) the British 2-8-0s were extremely popular, and considerable numbers of them have been taken over for civil services. For the working of leave and duty trains they were used mostly on the southern routes from Gennep and Nijmegen to Antwerp and Brussels; on a typical journey, No. 79232, hauling a heavy train of Belgian steel stock totalling 525 tons, covered the 39 miles from Gennep to a signal stop outside Tilburg in 72½ min. at an average speed of just over 32 m.p.h., inclusive of several severe slacks; on level track and with a clear road, 47 m.p.h. was kept up steadily.

For the heavy leave trains which in 1945 were put on between Germany and the Hook of Holland, the Dutch railways appeared to prefer their own 4-6-0 engines for the Nijmegen-Hook section, these being mostly of the handsome "3900" series with Belpaire fire-boxes and distinctive smoke deflectors. With No. 3903 of this type, and a load of nearly 650 tons, the 30½ miles from Nijmegen to Geldermalsen were covered in almost exactly the even hour, the sustained speed on level single line being 37.5 m.p.h.

Reverting to the French and Belgian services, an interesting overnight train was introduced in December 1944 between Brussels (Midi) and Paris and vice-versa. This was always a heavy train, loading to between 600 and 700 tons including two Wagon-Lits sleepers; over the Belgian part of the journey it was normally double-headed, but the S.N.C.F. employed a single "Pacific." When first put on, this train followed a rather circuitous route via Ghent, Courtrai and Lille; I recorded one run with 650 tons behind No. 6010 (4-6-0) and No. 1003 (4-6-2) of the older type, non-streamlined, in which 30 miles from Brussels to a signal stop near Ghent were covered in exactly an hour.

The return trip from Paris was made during very severe weather, and owing to the points being jammed by ice and

frozen snow, we were greatly delayed at Lille. Here, Belgian 4-6-0 No. 6003, piloted by an outside-cylinder 0-8-0 goods engine, relieved the Nord "Pacific." These two engines were soon in difficulty, and at Mouscron were taken off to some invisible siding, while the half-frozen passengers (there was no heat on the train, from the underframes of which huge icicles were hanging) stamped the snow-clad platform in order to get warm. Evidently no fresh power was available, for eventually the two engines returned to



One of the numerous 4-6-0 locomotives of German origin of the Belgian State Railways. It is hauling a local train composed of typical Belgian stock used for secondary services.

the train, but at Ghent the 0-8-0 gave up altogether and was replaced by a W.D. 2-8-0 which assisted No. 6003 on to Brussels. The overall journey from Paris to Brussels took 19 hours instead of the 10 hours scheduled.

A second trip from Brussels to Paris and back a month or two later, when the train was routed via Tournai instead of Ghent, yielded runs of 32½ miles from Brussels to Ath in 79 min. and of 19 miles from Ath-Tournai in 38½ min. The load was 687 tons and the engines were 4-6-0s Nos. 5006 and 6010 respectively. On the return journey, No. 6004 and 6040 of the same class ran with 702 tons from Ath to a stop outside Brussels, 30 miles, in 61 mins. Maximum speed on both these trips was 50 m.p.h.

In the early days of the Calais military route, Lille was a busy engine changing centre in the early hours of the morning, when both eastbound and westbound trains reversed in the station and exchanged French for Belgian engines or vice-versa. To start with, the French were compelled to use some very decrepit eight-coupled engines for most of

(Continued on page 46)

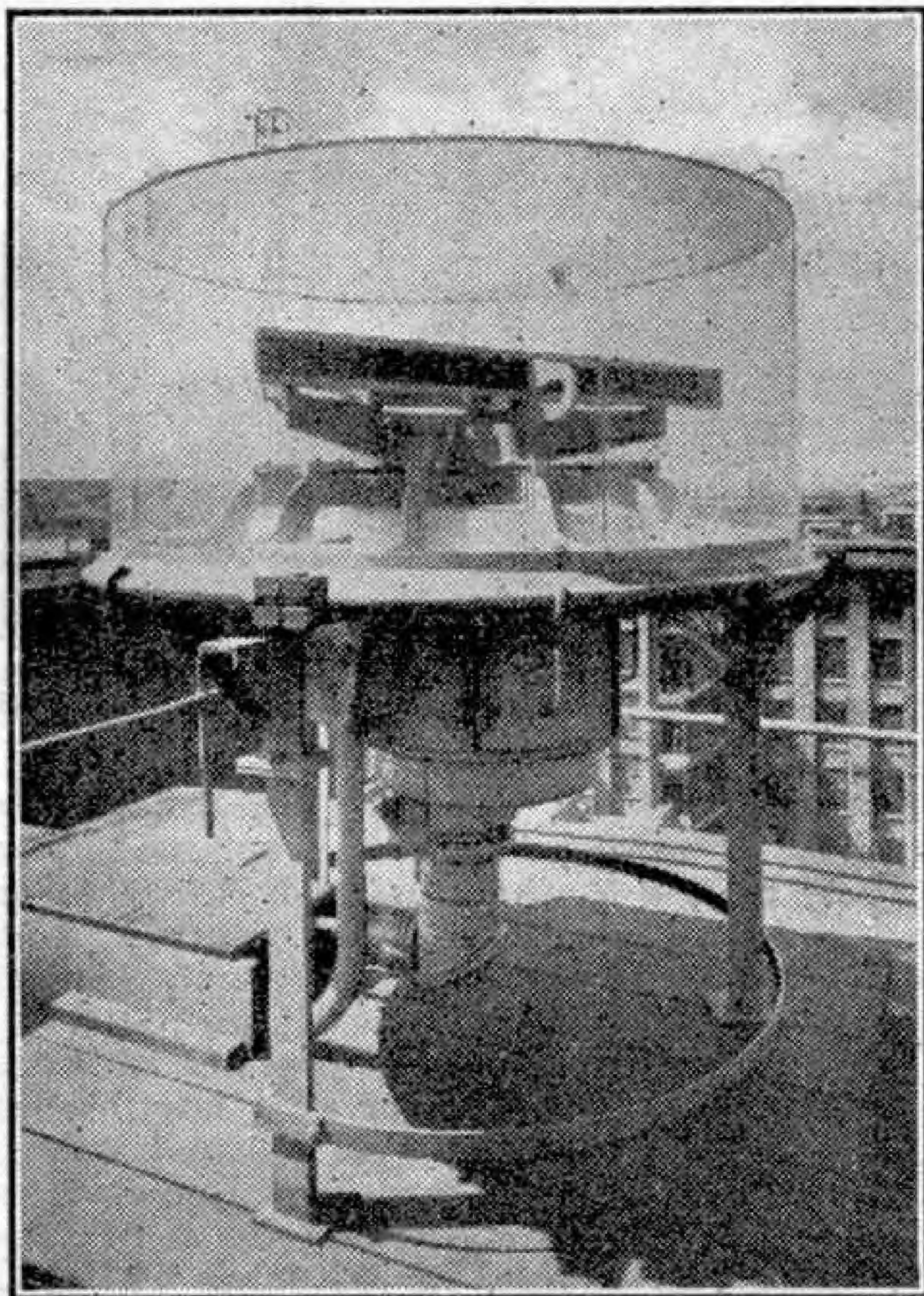
How Radar Aids Navigation at Sea

WE have all become familiar with the idea of using radar in wartime, to detect the approach of aircraft, or the presence at sea of submarines and other hostile craft. It can also be turned to peaceful purposes. An excellent example of this is its use on ships, especially in coastal and restricted waters. In such seas other ships, the shore line and navigational marks such as buoys must be

marked by a white circle on the upper illustration on the opposite page, which is a rough map of a section of the Thames and its surroundings, and below it is the view of this area on the screen of the MV Radar set. The markings on the lower illustration indicate objects from which radar echoes have been received; it will be seen that the course of the river is clearly marked, and the positions are indicated of a large number of stationary vessels and of others passing up and down the waterway.

The "Eye" of this remarkable aid to navigation is an aerial sending out a radio beam that is very narrow horizontally, but wide vertically. The purpose of this is to allow for the rolling of the ship in which it is mounted, usually above the wheelhouse, the best position being about 60 ft. above sea level. The aerial is turned round at the rate of 20 r.p.m. by means of an electric motor, but it can also be controlled by hand at speeds up to 4 r.p.m. Its use in all weathers is ensured by mounting it inside a perspex dome nearly 5 ft. in diameter, which is provided with a watertight seal and with electric heaters to prevent interference by the formation of the ice or mist in Arctic conditions. The heaters are controlled automatically by means of thermostats.

The rotating aerial is connected to a transmitter producing the short wave radio pulses necessary for radar operation. Whenever these strike an object they are reflected and are picked up by the aerial. After amplification the reflected signals are transmitted to the display unit, the central feature of which is a cathode ray tube, on the screen of which the radar picture is presented. This display unit is one of six incorporated in a console that forms the centre from which the whole of the equipment is controlled. Each unit is fitted in a cradle mounted on runners that can be pulled in and out like a drawer in a cabinet, and the main power supply is cut off when any one is drawn out. It is not necessary to keep a close watch on the screen when in open waters, for an automatic device also is provided that gives a loud pip note in warning of the presence of an object within certain range limits. It is interesting to see how the cathode



The rotating aerial of the radar set at the MV/SB Marine Radar School at the Woolwich works of Siemens Brothers and Co. Ltd.

kept in view by the navigator of a vessel, and in radar he has an eye that can see even in fog and at night.

Special radar equipment for use at sea has been developed by Metropolitan Vickers Electrical Co. Ltd., working in close association with Siemens Brothers and Co. Ltd. The latter firm have established a Marine Radar Training School at their Woolwich Works, in which the set has been installed on the top floor of a high building on the south bank of the Thames. The position of the school is



Rough map of a section of the River Thames. The white circle indicates the position of the Marine Radar School, Woolwich.

ray tube not only indicates when an echo is received, but also marks the position of the object returning the echo. The tube is a form of vacuum tube, a beam of electrons streaming across it from one end to the other under the influence of an electro-magnetic field. The beam is made to "scan" the broad circular end of the tube by means of electro-magnetic devices. It is moved radially by means of electro-magnetic coils, and these are turned round the tube at the same rate as the aerial is rotated, so that the beam is made to cover the whole of the circular end of the tube. This is shown by a glow on the tube, the end of which is coated with barium platinocyanide, which gives off a greenish yellow light when the electron beam falls on it.

Without the scanning device the beam would just give a central glowing spot; when the electro-magnetic coils are in action it is pulled out into a radial line, and this rotates when the scanning coils turn. The material on the end of the cathode ray tube has a long afterglow, so that the entire screen is illuminated.

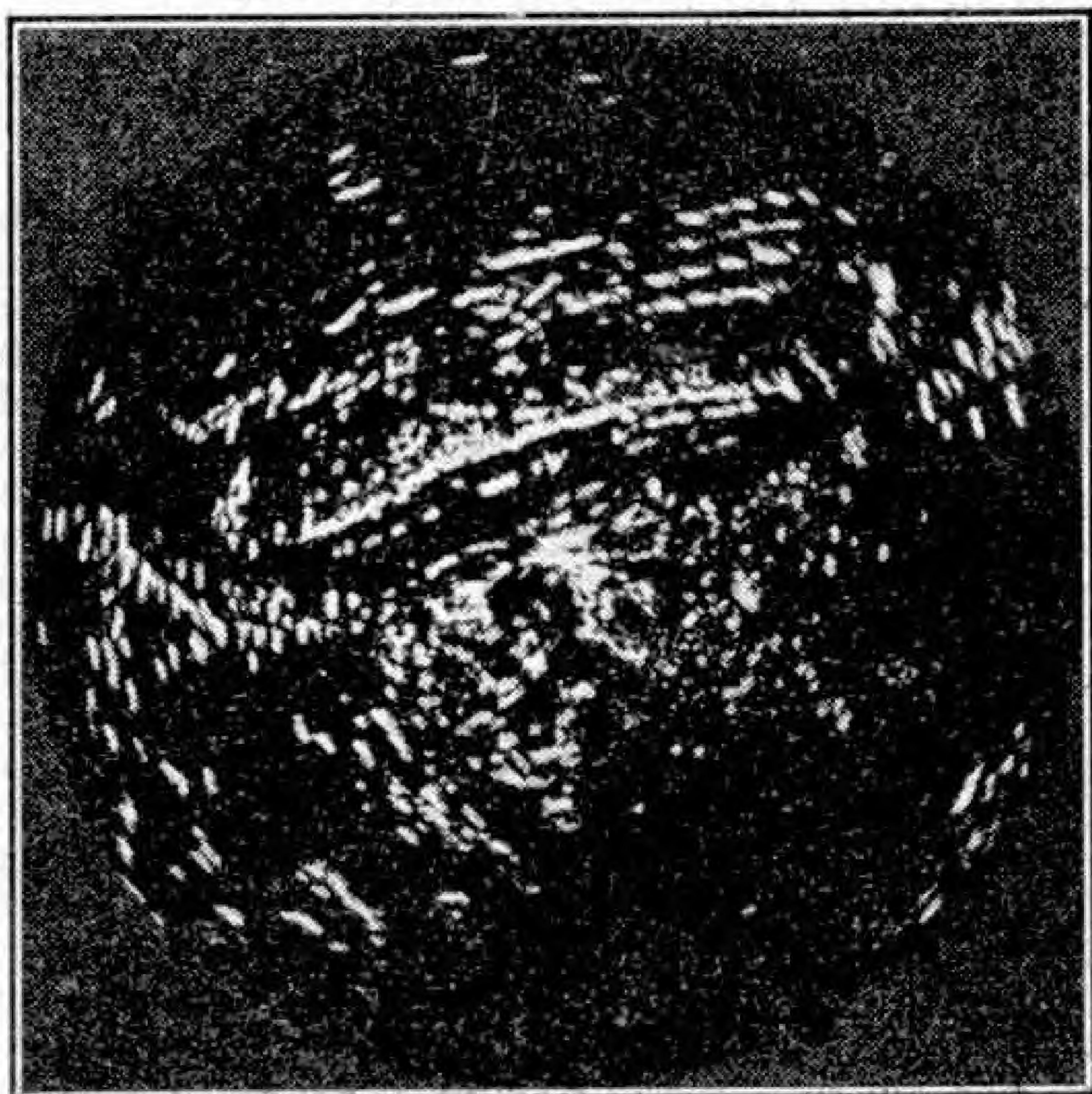
There is a radial trace for each transmitted short wave radio pulse, and matters are so arranged

that the trace is vertically upward when the radio beam points straight ahead. Echoes from objects "seen" by the beam are fed into the grid of the cathode ray tube, where they have the effect of brightening the trace, and it is these spots of brightening that give pictures such as that shown in our lower illustration. The bearing of the object is indicated by a scale of degrees and its range by its distance from the centre of the screen.

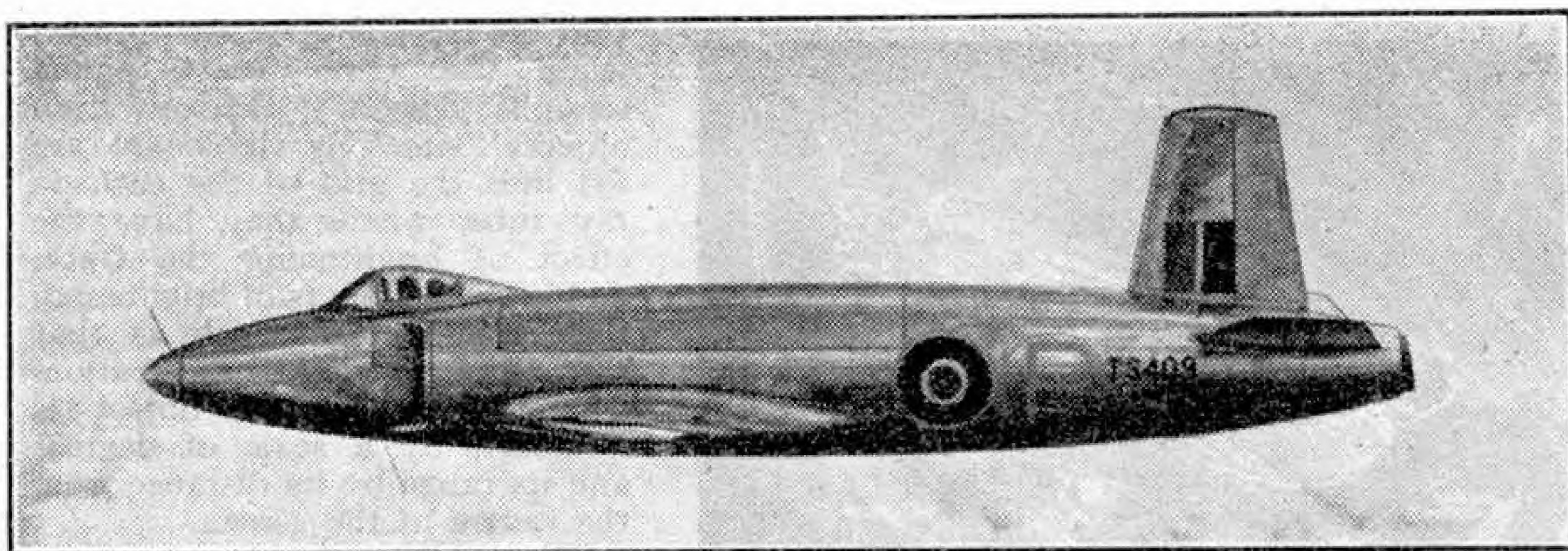
The bearings of objects near to the rotating aerial can be determined with increased accuracy by off-setting the beginning of the trace from the centre of the screen. This process is known as "expanding the centre." The display can be set for a working range of 3,000 yds., 15,000 yds. or 60,000 yds. according to requirements. An interesting and important point is that indications do not disappear into

the centre of the screen picture until the objects responsible are within 50 yds. of the aerial.

For the information in this article and for permission to reproduce the illustrations, we are indebted to the courtesy of Siemens Brothers and Co. Ltd.



The area shown in the upper illustration on this page as it appears on the radar set.



Supermarine E10/44, the latest British jet fighter. It has a 5,000 lb. thrust Rolls-Royce "Nene" engine.

To-morrow's Fighters

By John W. R. Taylor

WITH a final shattering roar Bill Humble raced low across the airfield of Radlett in the "Sea Fury," shot up into an almost vertical climb, and was gone Some time later we were still enthusing over his low-level loops and rolling climbs when there was a flash of silver, a noise like thousands of blowlamps all rolled into one and a momentary glimpse of a sleek bullet-like fuselage with square-cut wings. The Supermarine E10/44 jet fighter had arrived, piloted by Jeffery Quill. It seemed strangely symbolic, the end of one age in fighter design and the beginning of another. The "Sea Fury" is the last of the propeller-driven fighters, the last link in a chain of great names that will live for ever. The E10/44, like its predecessors the "Meteor" and "Vampire," heralds the beginning of a new age graced by strange new words—transonic, supersonic, athodyd, compressibility, laminar-flow—an age in which man is battling against formidable natural obstacles to reach incredible speeds twice as fast as sound.

It was back in 1942 that designers began to encounter Nature's barrier to high speed flight. One day a "Typhoon" was diving at nearly 500 m.p.h. when it began to shudder more and more violently until finally its tail was wrenched off. Over in America the same thing was happening to the "Lightning." Here was something never encountered before, something so deadly and apparently insoluble that it had the designers really worried. They attributed the trouble to "compressibility," a phenomenon already

well known to designers of bullets and similar high-speed projectiles and encountered by any object travelling at about the speed of sound (sonic speed)—760 m.p.h. For, although the "Typhoon" and "Lightning" were not flying at 760 m.p.h. when the trouble occurred, the air was flowing over their wings at that speed due to the wing contour, and consequently compressibility shock waves were set up.

A good non-technical definition of compressibility is given in "*Even I can understand*"—a little booklet prepared by de Havillands. "The speed of sound is the speed at which pressure disturbances are transmitted through the air. If a body such as an aircraft wing is travelling at a much lower speed than this, then it can 'warn' the air ahead of it that it is coming. The air then flows gently round the body with little turbulence. When the speed of the body approaches the speed of sound, however, this process is very much changed. Sudden changes of density and pressure take place, with accompanying drastic increase in drag and decrease in lift (in the case of a wing)." The result of all this is the formation of a compression or shock wave which breaks down the smooth airflow. The tail plane, which is in the wake of the shock wave, then suffers violent buffeting with serious consequences.

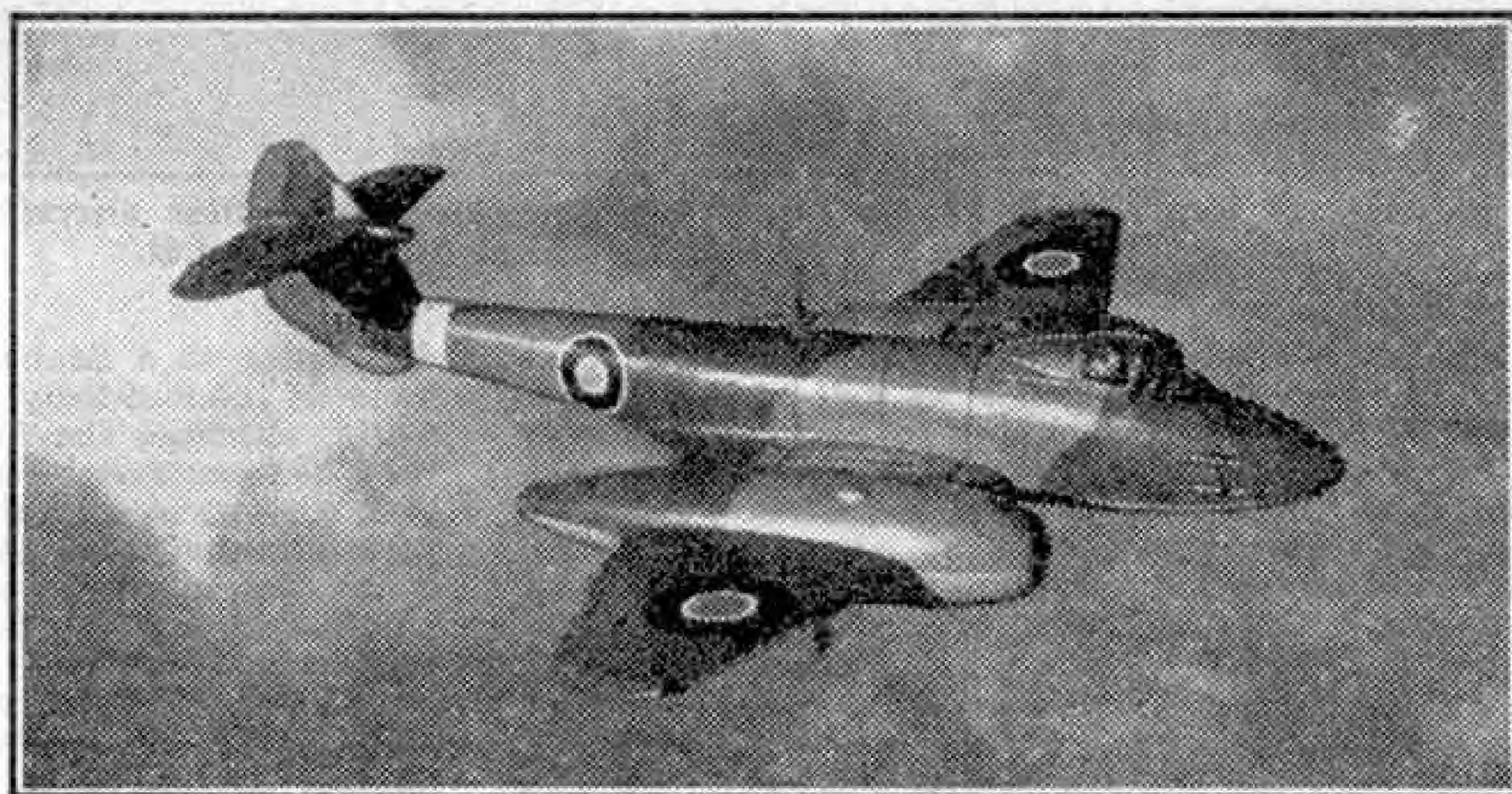
It is impossible to eliminate compressibility effects, but it is possible to postpone them and even to build structures strong enough to withstand the subsequent effects. Obviously, conventional wing sections were no use for speeds of

500 m.p.h., and so work was started on a series of new sections that would cause the air to flow smoothly over the wing for as long as possible before a change in contour caused turbulence. The new aerofoils were named "laminar-flow" and have a "sharp" leading edge, with their maximum depth well back towards the trailing edge. At the same time it was found that sharply swept-back wings are better able to postpone the effects of compressibility, and the first problem of high-speed flight was well in hand.

Then came the problem of providing sufficient power to overcome "drag" at high speeds. Obviously, the bigger and less streamlined an object is, the harder it is to push it through the air. This did not matter much at low speeds; it was just a question of adding more power, and it was easy to clean up (streamline) faster machines. But when 400 m.p.h. was reached more trouble was in store, and it needed a colossal increase in power to increase speeds from 400 m.p.h. up to 500 m.p.h. In fact it seemed as if the limit had been reached in aircraft speeds, for propeller tips were going so fast that they were themselves encountering a very serious form of compressibility, with consequent vibration.

Then the jet engine came along and gave aviation a new lease of life. At once almost unlimited possibilities were opened up and designers began to think in terms of 600, 700 and even 1,000 m.p.h. The

problems of overcoming compressibility trouble naturally get worse as 760 m.p.h. is approached, but above that the trouble tends to disappear. Consequently, once aircraft can smash through the "sonic barrier" of compressibility at 760 m.p.h. there is no limit to the speeds they can attain.

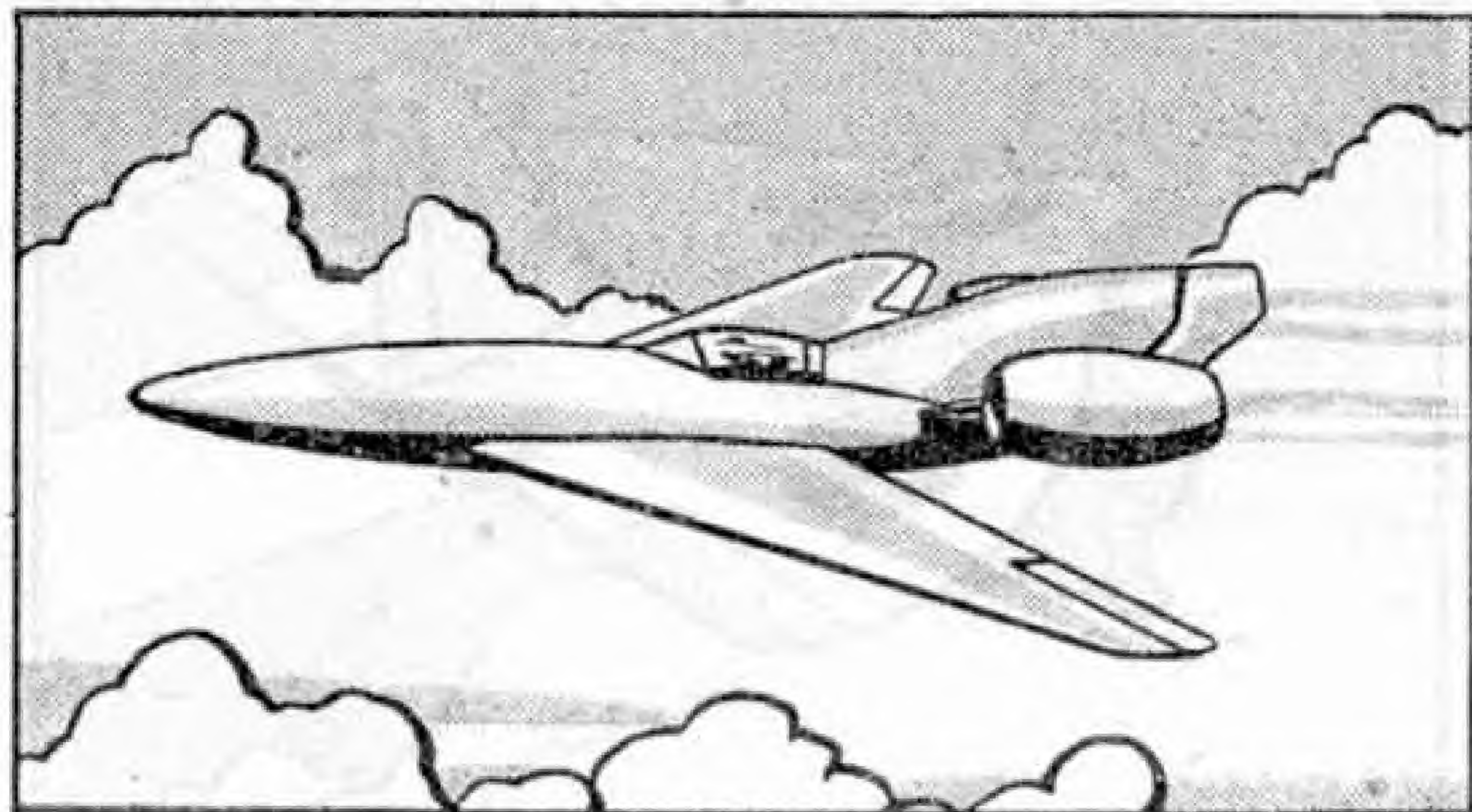


Gloster "Meteor" IV jet fighter, the type that holds the World Absolute Air Speed Record.

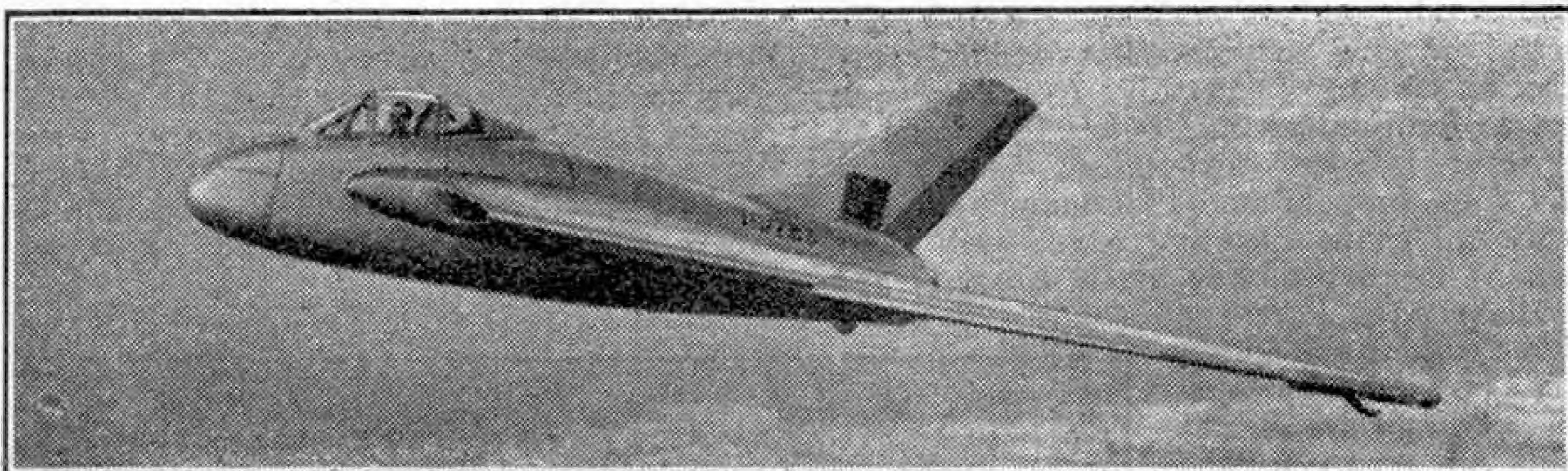
So, while the armies struggled against each other all over the world, Allied and German scientists were waging another grim battle in laboratories and test-houses far behind the front lines, first to overcome Nature itself and then to devise weapons that would be revolutionary and deadly enough to smash their enemies from the skies. A careful study of the wartime technical discoveries of German designers has shown that they had advanced further into the unknown than our own, but, fortunately, had not the time to turn their discoveries to practical use. One branch of their research led to the "Doodlebug," V-2 rocket and the other missiles described in my article on

"Bats, Glombs and Gorgons" in the October 1946 "M.M." But here we are concerned only with true piloted aircraft, and in this direction too some incredible and advanced types were being developed.

The first jet fighters, both German and British, had a more or less conventional twin-engined layout, with jets replacing piston engines. Examples are the Me 262 and Gloster "Meteor." Of course their designs were considerably "cleaned up," they had the latest "high-speed" wing sections, and very careful attention was paid



A German jet project. The Focke-Wulf twin-athodyd powered fighter. Drawing by A. V. H. Jarvis.



A pre-view of to-morrow's fighter—the D.H.108 jet-propelled tailless aircraft. Photograph by courtesy of The de Havilland Aircraft Co. Ltd.

to the surface finish. But it was soon clear that ideas of basic airframe design as well as the engines would have to be considerably revised before speeds of much over 600 m.p.h. would be practicable. To help solve these problems the Germans were lucky enough to have the services of Alexander Lippisch on the Messerschmitt design staff. He had been designing tailless aircraft since 1922, and believed that this type of machine, with sharply swept-back wings, offered the best chance of breaking through the sonic barrier.

Meanwhile the German Walter company, who had been making rockets for assisted take-off of heavily-loaded bombers, had designed and built a remarkable little rocket-engine known as the Walter H.W.K. 109-509, which weighed only 365 lb. and developed 3,300 lb. thrust. It was little use for anything but interceptors, however, as it used up fuel at an enormous rate and no aircraft could carry enough for more than a few minutes' duration.

Lippisch was given the job of designing a fighter to use the Walter engine, and so was born the tailless Messerschmitt 163 "Komet," which had an endurance of about four minutes at 558 m.p.h. The German Air Staff decided that such a limited endurance was no drawback to an interceptor as, if it were fast enough, it could sit on the ground near important military objectives until attacking bombers came into range, then climb after them at terrific speed, engage them and land, all in a few minutes. It did not work out quite like that as, for one thing, British "Mosquito" bombers were so fast that they could change course when they saw the "Komets" take off, and bomb an alternative target out of range of the interceptors. Also, the "Komet" was very experimental and did not prove any too reliable—in fact "Komet" squadrons were regarded as suicide units by the rest of the Luftwaffe. Still, it was the start, and the Me 163 taught a lot of useful lessons—lessons that were available to Allied technicians after VE-Day.

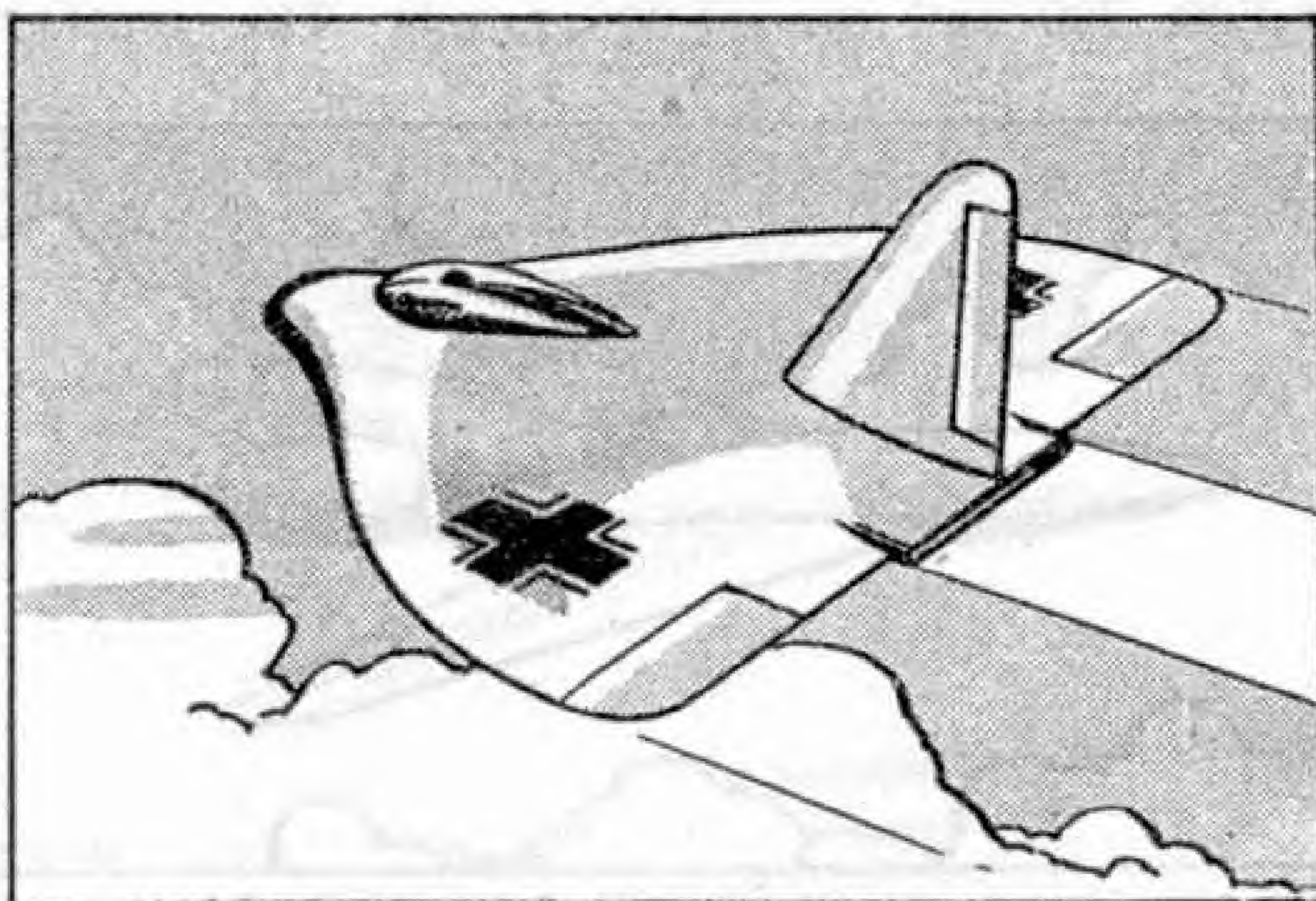
The urgency of war cost the lives of many good pilots in the little "Komets." Now, in peace, the urgency is not so acute, and the Allies can experiment and develop new fighters without so much waste of precious lives. Nevertheless a price must still be paid for progress in the air, as the recent sad loss of Geoffrey de Havilland pointed out all too well. The little de Havilland 108, one of which he was flying at the time, is a great improvement on the Me 163. Not only is it faster, with a speed in the region of 650 m.p.h., but its 3,000 lb. thrust "Goblin" jet engine uses less fuel and gives a consequently better endurance than the "Komet's" rocket-motor.

The D.H. 108 was designed primarily to test out many theories on transonic flight, and is a sort of prototype for a tailless jet-propelled mailplane that de Havillands are

developing to a Brabazon specification. It is at the moment undoubtedly the fastest aeroplane in the world, although the Americans have a machine that may be even faster—in fact it may prove to be the first supersonic aircraft. Designated the Bell XS-1, little information on it has yet been released, but it is known to be a small short-endurance aircraft powered by a rocket-motor, probably developed from the Walter.

The XS-1 is being controlled by radio on its first flights and has already been released from other aircraft at 13,000 ft. and flown under control at 350 m.p.h. when it proved very stable and controllable. It is planned eventually to release it at height, complete with pilot, after which, it is hoped, it will climb to around 80,000 ft., and, in a subsequent dive, pierce the sonic barrier at speeds of nearly 1,000 m.p.h. At 80,000 ft. the outside temperature will be -67 deg., but the frictional heat caused by airflow over the aeroplane will be such that the pilot will need refrigeration, not heating! It is a terrific gamble with the unknown, and the results will be awaited with great interest.

But even jets and rockets will, in time, be superseded in high-speed fighter aircraft by an even simpler and more powerful form of engine—the athodyd or ram-jet. What is more, most of us are already quite familiar with one aircraft using an athodyd unit—Hitler's V1 "Doodlebug." In this case the Argus engine is of the "impulse duct" type, and consists basically of a metal tube, with a series of non-return flap valves and fuel injection nozzles at the front end. As the machine goes through the air, pressure on the front of the unit opens the valves and air is "rammed" into the duct, mixed with fuel and ignited. The tube is so designed that (Continued on page 46)



Lippisch's tailless athodyd fighter with carbon-block "engine." Drawing by A. V. H. Jarvis.

Engineering Apprentice Training

The David Brown Scheme

THE apprentice training scheme operated by David Brown and Sons (Huddersfield) Ltd. at their Huddersfield works will interest readers generally, and particularly those who are contemplating an engineering career.

David Brown and Sons' first venture into apprentice training, apart from instruction by foremen, was made in 1912, when they set up a special training school, separate from the works, to instruct youths in the traditions and skill of the trade. Here, in rooms set aside in a local

tools that cannot be employed in older patterns. Most of the work done is put to commercial use, because it has been found that apprentices working metal that was destined for the salvage bins lost interest in the higher quality of their jobs.

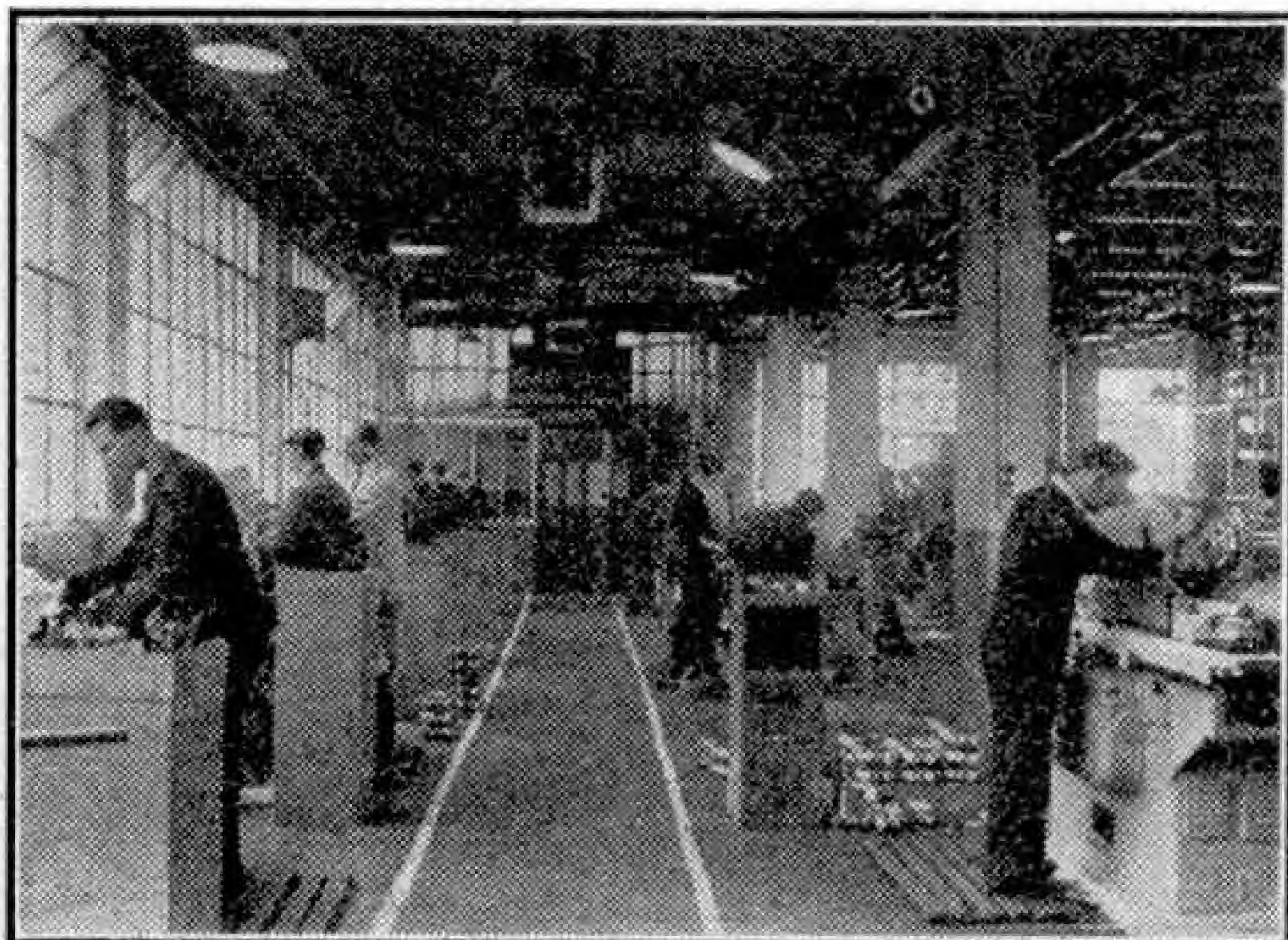
There are three types of apprentice training courses. First, the trade apprentice course, open to boys of 14 and upwards from secondary, junior technical, central and elementary schools; second, the engineering apprentice course, open to boys of the 16-plus group from secondary or public schools; and third, the student apprentice course, available for boys from universities and technical schools of approved standing. In this last course the training given depends on the line of specialisation the student wishes to follow, but in all three courses the boys are required to go through a period of shop training. Experience has proved that shop training is essential to every boy, even though his ultimate aim may be the sales department, the drawing office or the research department.

The apprentices are required to take mutually agreed courses at evening classes and, in certain cases, at day classes, in which event the school fees are borne

by the Company and the boys are paid full wages.

Throughout the training the boys' progress is very carefully watched and noted. From his experience of any particular student the Training Officer can forecast fairly accurately how that boy will fare at Evening Continuation School examinations; he has in his files an estimate of the lad's manipulative skill, a note as to how he has scored in the training school's periodic test papers, and his marks for good conduct and time-keeping. This dossier is of great assistance when parents seek advice as to the further training of their sons. In addition bonus awards are made each July for marks gained in examinations.

Special attention is paid to the students' medical welfare.



One of the shops in the apprentice training school of David Brown and Sons (Huddersfield) Ltd., to whom we are indebted for this photograph and the one on which the cover is based.

school, boys were taught the meaning of engineering terms, how to read drawings, and how to follow descriptions of the various processes of manufacture. Limited as it was by the accommodation available, the scheme proved most successful, but it stopped short at the point of practical work. Steps were soon taken to remedy this deficiency, however, and the scheme was extended into a full plan of apprentice training, carried out on the works premises in a department completely separated from the manufacturing organisation.

Under the direction of a Training Officer assisted by specially trained instructors, manual work alternates with classroom instruction, and the boys are taught to operate various types of machines, from the centre lathe to the latest high-speed machines using the hard tungsten carbide

Railway Notes

S.R. "West Country" Locomotive Performance

"West Country" locomotives have recently become familiar on the Continental as well as ordinary London-Ramsgate expresses. We are now for the first time able to give details of actual performance on one of the latter runs, which was logged by Mr. R. A. H. Weight.

The train was the 1.15 from Charing Cross, which after calling at Waterloo (Eastern) to pick up travels without a stop to Ashford, and then goes on to Folkestone, Dover, Ramsgate and Margate. The engine was No. 21C 131, a Ramsgate locomotive which with the same crew was working a 200-mile round trip by the Dover route to London and back. The train consisted of 11 vehicles, comprising parcel and mail van, one of the newly inaugurated restaurant cars on the Eastern Division, in which a good hot lunch was served, and nine corridor coaches, weighing about 360 tons all found.

From Waterloo the maze of tracks round about London Bridge were threaded carefully. Then begins a long, broken climb through the suburbs out into the North Downs region of Kent, up which speed varied from the first attained maximum of 47 m.p.h. before Hither Green Sidings, where locomotives of all four main line companies can be seen, to 37 on the 1 in 120 rise past Elmstead Woods. It rose to 51 near Orpington, and then fell to 44 at the top of the final 1 in 120 at Knockholt, the engine being worked extremely easily throughout the run. Sevenoaks, 21½ miles, was passed exactly as booked in 29½ min., with steam almost shut off, and 70 was soon attained on the 1 in 122 descent past Hildenborough, though a slowing for engineering work prevented any further speeding down to the Medway Valley. The train drifted round the western curve and through Tonbridge Junction station, where there is a service slack, on the centre fast line slightly before time, 28½ difficult miles in 37½ min.

When speed should have risen to the mile a minute rate, just before the hop-picking centre of Paddock Wood there was a severe slack to about 15 m.p.h. on account of p.w. relaying work for more than ¼ mile, so that the express was almost at Marden, five miles further on, before 60 m.p.h. was attained. Now on a much straighter and less severely graded section there was some grand going, 70-71 m.p.h. on the level at Headcorn, a maximum of 77 on a small descent near Pluckley and above 70 up the 3½-mile slight rise to Chart Siding. The "Pacific" was running full tilt with Ashford coming into view, an almost punctual arrival seeming certain, when the brakes went hard on as the western junction signals were at danger, causing a bad slowing outside. The time to the station stop was 67 min. for 55½ miles from Waterloo, compared with the 65½ min. of the working timetable.

Allowing for out-of-course delays the net time was little over 62½ min., and with a clear road and harder running such a trip could easily be made by a 4-6-2 in an hour. As it was, the trip was scarcely dis-

tinguishable from a good "Schools" performance. Those fine 4-4-0s incidentally have a greater cylinder volume than the "West Country" 4-6-2s, though the latter boast more adhesion, larger boilers, higher steam pressure and more superheat, all valuable features in hilly country.

L.M.S. Locomotive Stock Alterations

The third of the new unstreamlined 4-6-2 express "7P" class finished in the latest style is No. 6255 "*City of Hereford*," allocated to "1B," Camden shed, London. "5XP" or "Patriot" 3-cyl. 4-6-0s Nos. 5521 "*Rhyl*" and 5530, "*Sir Frank Ree*" have been rebuilt with taper boilers and improved steam distribution as on "Jubilees" No. 5735-6, being now classed "6P," of similar power to the "Royal Scots."

New "4P" 2-6-4Ts built at Derby have been numbered and allocated as follows: Nos. 2246-7 to 27A, Polmadie, Glasgow; Nos. 2248-52 to 26A, Newton Heath, Manchester. A further Horwich built class "5" 4-6-0 is No. 4986, shedded at 23C, Southport.

Southern Tidings

New "West Country" engines have been placed in service up to No. 21C 146 at the time of writing. Nos. 21C 141-3 are allocated to Exeter, taking

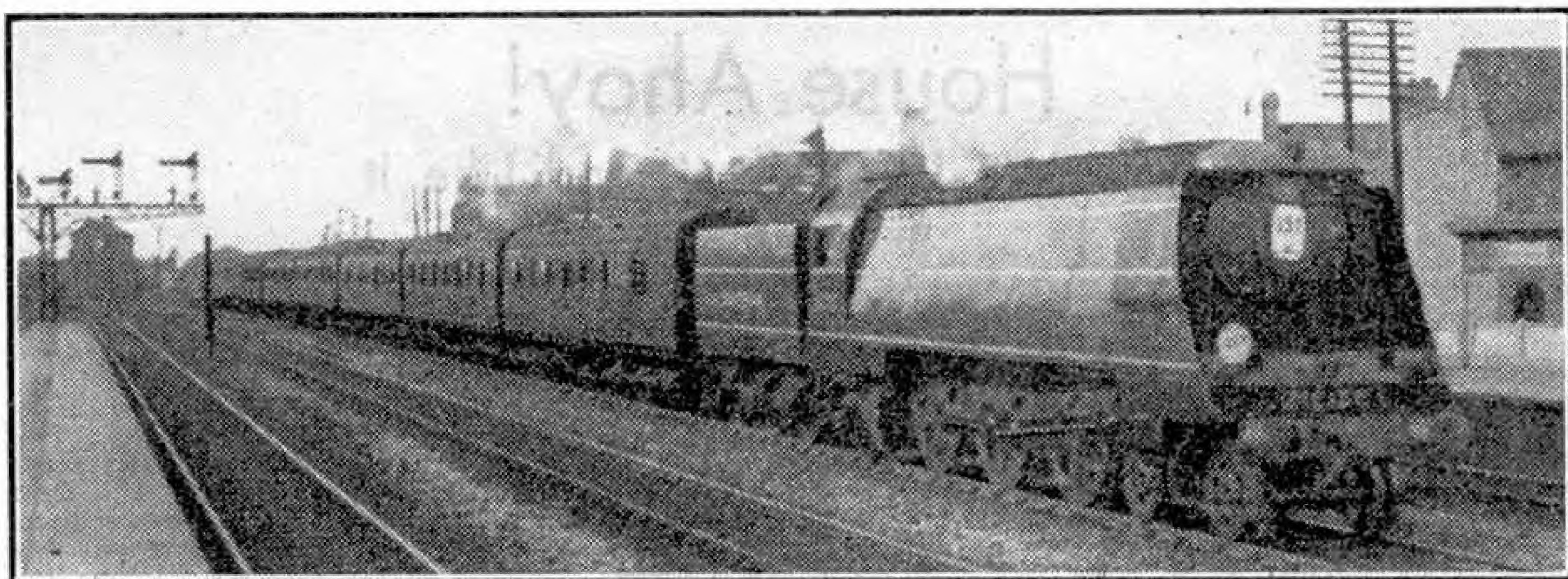


A down empty wagon train passing over Ruislip troughs on the G.W.R. and L.N.E.R. Joint Line to Princes Risborough and Ashendon Junction. The engine is W.D. 2-8-0 No. 77230 on loan to the L.N.E.R. Photograph by C. R. L. Coles.

turn on the regular passenger working over the G.W.R. The names mentioned in the November 1946 issue are being allocated in order to Nos. 21C 121-30, but the spelling for No. 21C 123 should be "*Blackmoor Vale*" and not as previously printed. Nos. 21C 111 and 21C 113 are to receive the names "*Tavistock*" and "*Okehampton*" respectively.

"Schools" class engines Nos. 928-30 are transferred to Brighton shed, whence they work through trains to Bournemouth and Salisbury, so that there are no "V" class engines now shedded in the Western Division, although these run on to it. The "*Bournemouth Belle*" Pullman express to and from Waterloo daily is hauled usually by a "Merchant Navy" stationed at Nine Elms; an average 10-car load weighs just over 400 tons and some very fast running has already been recorded. The return journey to London in the evening, allowed only 2 hr. for the 108 miles including a stop at Southampton, is decidedly smartly timed, being probably the first instance in Britain of a restored pre-war quickest long-distance booking. A "*Devon Belle*" West of England Pullman express service is planned for next summer.

The two electric locomotives, Nos. CC1-2, work night and day freight trains between South London yards and Three Bridges, Horsham and Chichester,



A Kent coast express passing Tonbridge, with "West Country" 4-6-2 No. 21C 130 at its head. Photograph by A. C. M. Clements.

also a parcel train to Bognor, from early on Monday to late on Saturday. They are manned by Horsham crews, two men at a time.

"Blitzed" 10 times and hit by two "VI" weapons during the war, Clapham Junction, "The World's Busiest Junction" recently described in these pages, is to be renovated at a cost of £12,000.

Rebuilt "Terrier" 0-6-0T No. 2635, class "A1x," has been renumbered 377S as a service engine for shunting at Brighton Works. We understand that No. 380S, the veteran "Terrier" in original state that has been performing this duty for a long while, is to be restored to old time yellow paint and L.B.S.C. style for preservation at a railway museum. Her name originally was "Boxhill."

L.N.E.R. Locomotive News

New "B1" standard 2-cyl. 4-6-0s are coming into service from the works of the North British Locomotive Co. Ltd. every few days. It is understood that the latest, numbered from 1096 up, are painted green and that electric lighting equipment will be provided when supplies of materials permit. These engines are working on many sections of the line in England and Scotland, numbered from 1000-9 and 1040-99; others with 10xx and 11xx numbers are under construction.

The latest "A2" 4-6-2s from Doncaster Works are Nos. 514 "Chamossaire," 515 "Sun Stream," 516 "Hycilla" and 517 "Ocean Swell." Re-numbering has now largely been carried out in accordance with the amended plan mentioned in these notes and all the Gresley "Pacifics" will shortly be carrying numbers 1-113. The rebuilt "Great Northern," formerly No. 4470 and now No. 113, is the only engine of class "A1" at present.

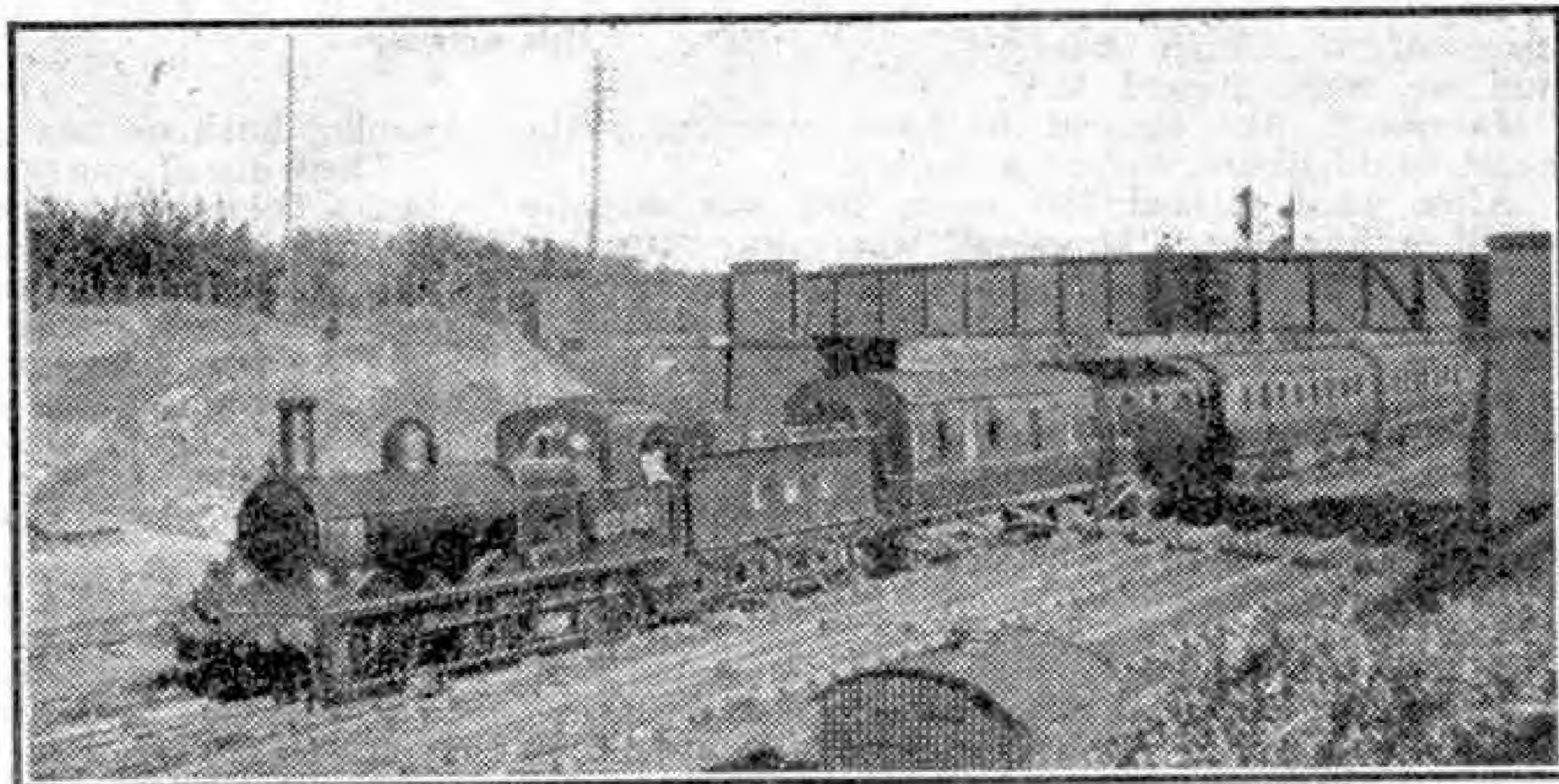
All "B12" 4-6-0s in England on the G.E. Section are again of the rebuilt "B12/3" type. More Ministry of Supply 0-6-0 saddle tanks have been taken into service as "J94" shunting locomotives. A further rebuilt "Sandringham" 4-6-0 with 225 lb. per sq. in. boiler pressure and two cyls. is "Belvoir Castle," new number 1632, becoming "B2" instead of "B17" class. No. 1671 "Royal Sovereign," the beautifully kept example of this modified "B2" type, has

again been on Royal Trains recently between King's Cross and King's Lynn. This green engine is stationed at Cambridge, working to Liverpool Street as well as to King's Cross with ordinary main line trains when not otherwise required.

Darlington Works have completed the construction of "06" L.M.S. type 2-8-0s numbered 3145-7. Additional rebuilds from "04" to "01" 2-8-0s are No. 6639; also No. 6635, renumbered 3886. Many "Austerity" 2-8-0s are in service on the line, seen in transit and also waiting overhaul. Such locomotives work a great deal on the G.N. Section in the south, where the variety of engines noted on freight trains lately has included "06" 2-8-0s, "J39" 0-6-0s, N.E. "B16" 4-6-0s, "Q6" 0-8-0s, "K2" and "K3" 2-6-0s as well as "Pacifics" or "Green Arrows."

A reader has reported a very good run by one of the latest "A2" "Pacifics," No. 513 "Dante," with an up Leeds morning express worked right through. Several minutes were regained between Doncaster and Grantham. After remanning by a King's Cross crew, and leaving Grantham five minutes late with 15 cars, fully 500 tons, the arrival at King's Cross was four min. early at 12.8 p.m. 105½ miles in no more than 110 min.

It is many years since an Ivatt 4-4-2T of the "C12" class, built for London suburban passenger traffic round about 1900, has been seen on duty in the King's Cross area, but 4521 has for some time been allocated to the somewhat lowly but useful duty of acting as a stationary boiler to supply hot water at Hornsey Carriage Sidings.



Approaching Kettering on the Cambridge-Kettering branch of the L.M.S. The locomotive is an ex-Midland 0-6-0 No. 22930 with modern Belpaire boiler. Photograph by C. R. L. Coles.

House Ahoy!

How We Live Afloat, and Like It

By Norman Hunter

WHEN two flying bombs landed near our home in 1944, we didn't know that the blast was going to land us on a yacht on the Thames. The process wasn't quite so sudden as it sounds. We began by hurtling out into the country, where for three months the family, split up into inconvenient sections, surged from billet to billet. The few essential belongings we took with us grew fewer and more essential as transport, beginning with a comparatively select motor van, gradually became less and less imposing, degenerating successively to horse van, open cart, builders' truck and wheelbarrow. By then we were in a caravan in a very wet field.

After splashing through deeper and muddier and more extensive puddles we decided to go afloat properly and buy a boat to live in. The first boat we inspected was a converted life-boat. It floated very well, but it had what yachty people call "sitting headroom." This means you can't stand upright in the cabin except under the skylight, and you can't stand under the skylight because the table has to stand there! We crawled out again to find the bows of a motor yacht towering above us like a liner.

"There's a boat for us," said my wife, and when the Skipper, an unbelievably nautical gentleman with a smile that went from port to starboard, added "Full headroom from stem to stern, bathroom, electric light" we nearly swept him overboard in our anxiety to get a look at it all. We clambered up slithery ladders and down still more slithery ladders; we leapt over little bobbing boats; we stepped apologetically across the poop deck of a Dutch barge, and we were aboard M.Y. "Maurina." She seemed to have everything the heart could desire, except a funnel.

After what seemed 300 years, but was actually about a fortnight, "Maurina" was ours, "together with," as the documents so charmingly put it, "her boats, guns, arms and ammunition." We moved in the day the previous owners moved out. In fact we were so frantic to get aboard we almost moved in on top of them.

"Don't you find it damp on the water?" "Isn't it cold?" "It must be very cramped." Our friends seem to have visions of our crouching over a smoking oil stove in the dank depths of a smelly hold. They get rather more than a surprise when they step into our airy, well-lighted saloon with its pale green enamelled walls and ivory ceiling—"deck head," please—and its open-fronted stove that stays alight day and night throughout the winter. "Why you've got pictures on the walls!" We certainly have, and a radio, and running water from proper taps, not to mention curtains at the portholes, and spring mattresses.

There are of course no draughts along the floor in yacht cabins, and as for warmth, I can only say that we invariably feel chilly when we spend a night in a house, after our snug bunks.

Admittedly it gets rather crowded when we are all in the saloon together, plus our nine stone bull mastiff. He sleeps in the wheel house, and keeps anchor watch in the daytime, emitting the most fearsome sounds when anyone approaches the boat, accompanied by a terrific tail lashing if the approacher is a friend.

There is a refrigerator that works by paraffin.

We cook by gas supplied from portable cylinders and we make our own electric light with a miniature petrol engine and dynamo in the engine room. The only other furniture in the engine room at the moment is a little coffee table. No, we don't use the engine room as a lounge. The table arrived there via the engine room hatch and wouldn't go through any of the doors, yacht doors being on the narrow side. Soon it will have to go out through the hatch again because our six-cylinder 40 h.p. Gleniffer marine engine, which is being re-conditioned ashore, will be coming to take possession.

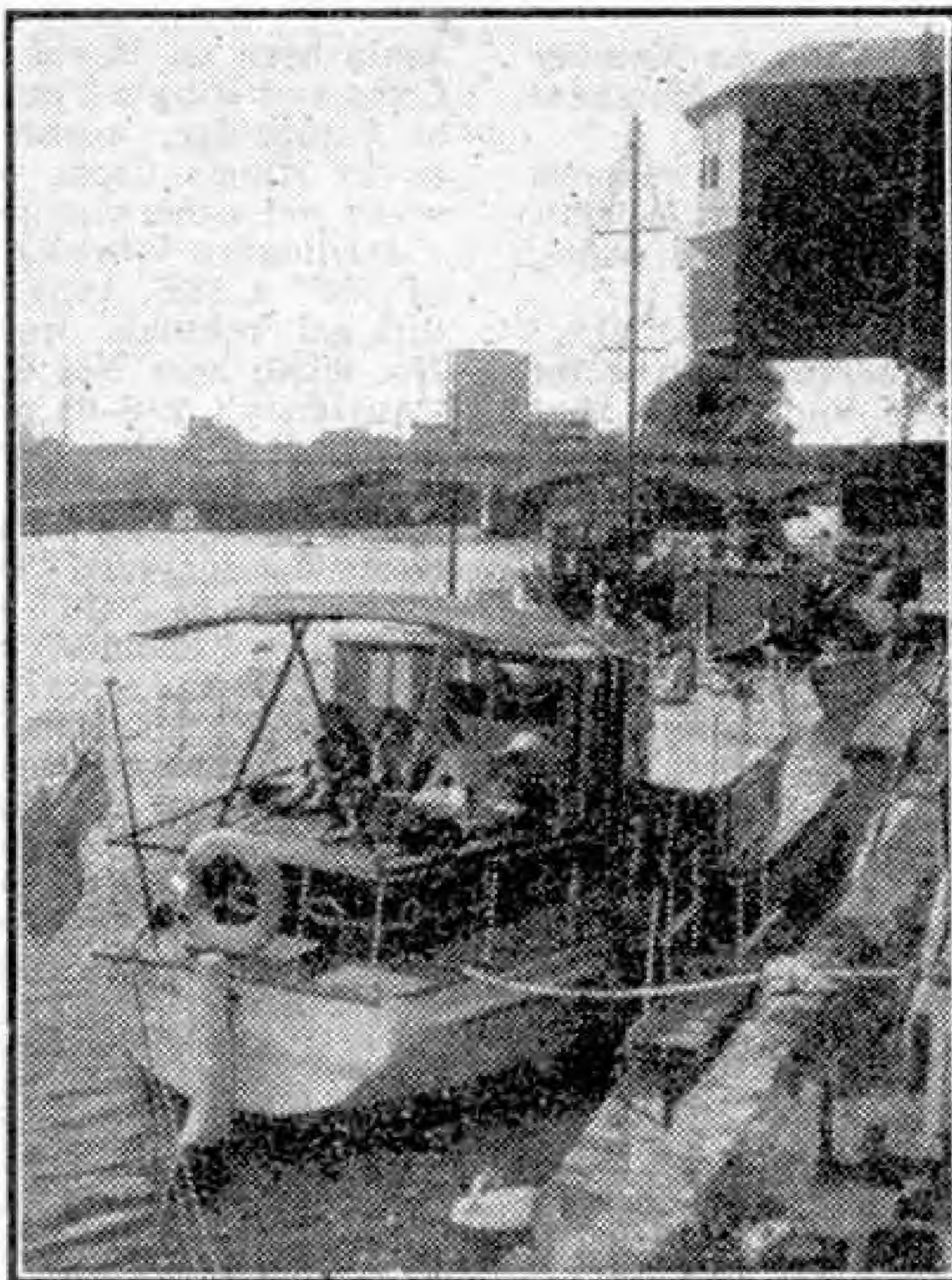
Above the engine room is a wheel house with a built-in folding table and sliding roof. This makes a perfect sun trap and is as good as an extra room. And of course there is the deck; no, there are the decks. The forward deck with the main mast, two ventilators, with their red mouths perpetually open in delighted astonishment at their surroundings, and the winch and two anchors. The after deck has a temporary awning, made from a tarpaulin, until we can get a better one.

There are of course drawbacks. The drinking water tanks, holding 130 gallons, have to be filled each week, and the decks have to be washed down. The brass has to be polished, and there is always painting or varnishing or splicing rope or some other sea-faring sort of job to be done. The only real difference between maintenance jobs on a yacht and on a house is that you just can't neglect the yacht.

Occasionally the bottom must be scrubbed and painted, but as "Maurina" is teak, once in three years is enough for that tiresome job. Father Thames has a disconcerting habit, even though he is not tidal where we lie, of rising a foot or two occasionally and then suddenly subsidising. This little trick can quite easily leave a boat sitting high and dry on a ledge if you don't happen to be wise to it.

We fly the red ensign proudly from our ensign staff at the stern and our own personal house pennant from the main mast.

Yes, she certainly looks a good ship. But I do wish she had a funnel.



The motor yacht "Maurina" at her moorings. This fine vessel is the home of the author of this article.

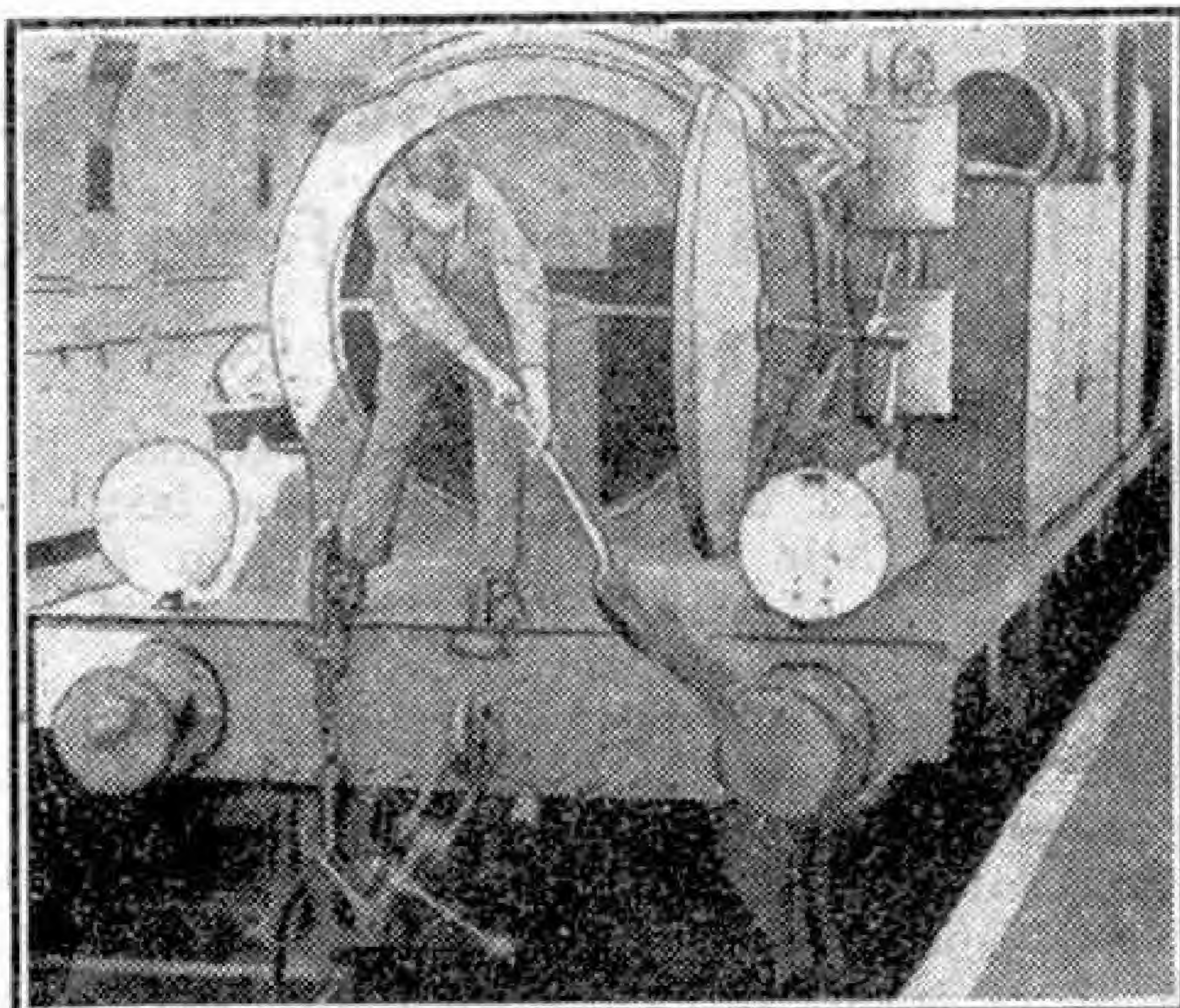
Station-on-Sea

By "Shed Superintendent"

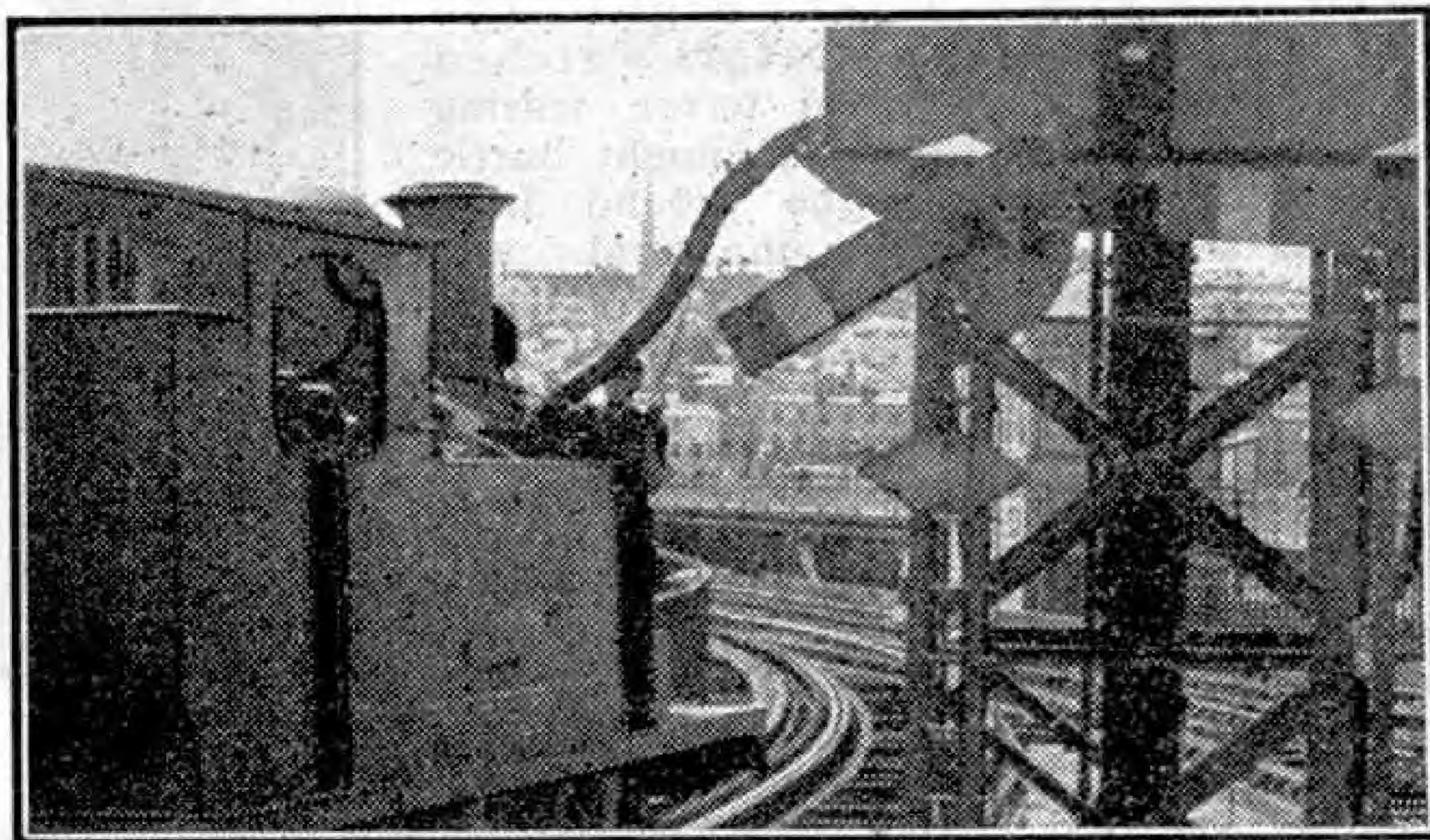
THE Isle of Wight is a mecca for railway enthusiasts in the South. You need go no further than Ryde Pier Head to observe many unusual features. On stepping off the steamer, you find yourself at a railway terminus nearly half-a-mile out to sea!

In rough weather the waves lash uncomfortably close to the carriage floor, and the sensations of the visitors are very different from the atmosphere of smoke and drabness which surrounds a city terminus.

At Ryde Pier Head the engines are given attention between trains, the nearest locomotive depot being some way away on the other side of the town.



Emptying the smokebox of Engine No. 15 "Cowes" at Ryde Pier Head.



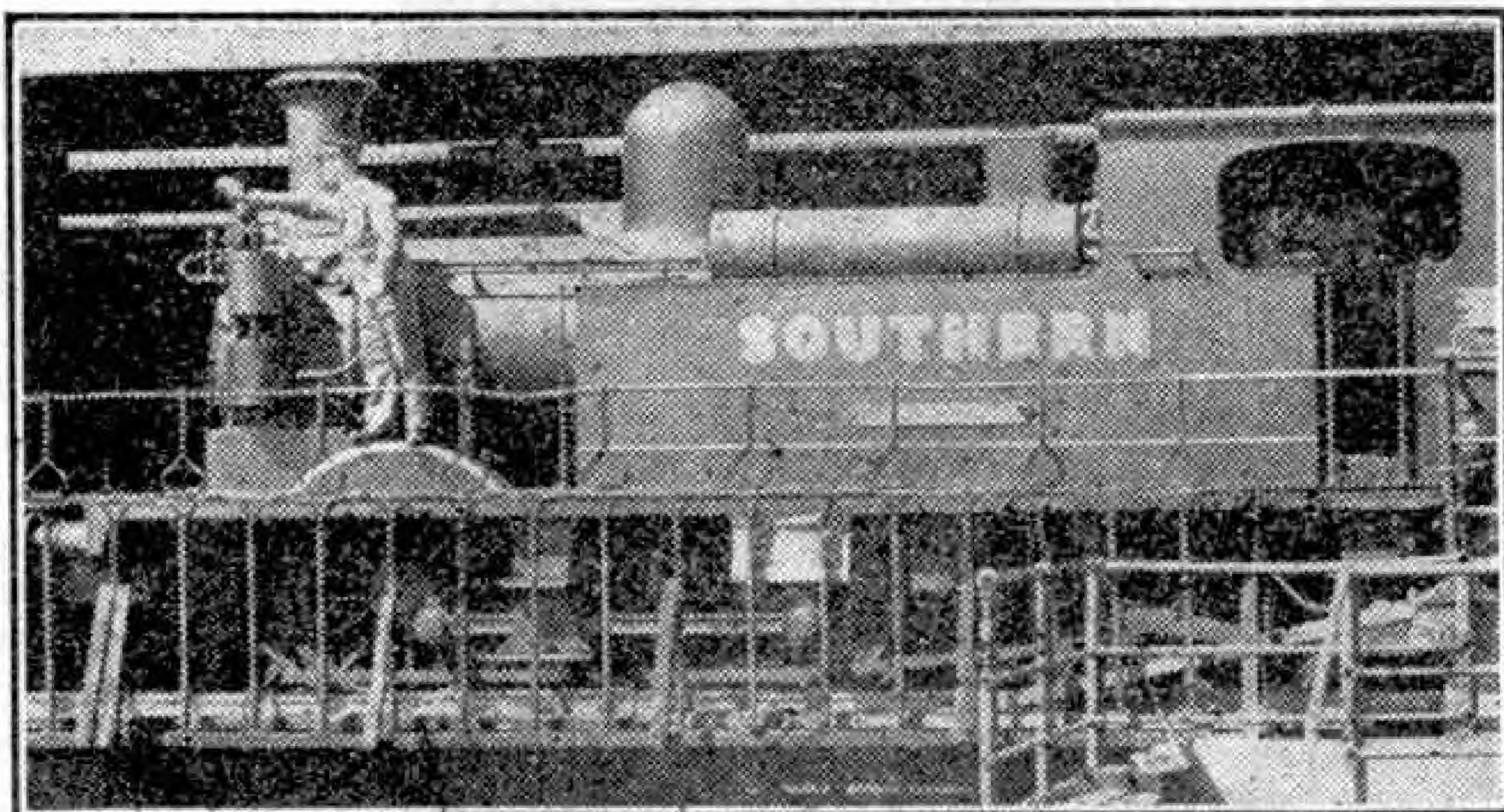
Engine No. 14 "Fishbourne" taking water at Ryde Pier Head.

A water main runs along the pier to a tank situated off the end of the middle platform, and to take water the fireman stands on the engine framing, controlling the water valve by pulling a wire.

All the Island engines are tanks, there being four E.1s, three A.1.Xs and twenty 0.2s, so that no provision is made for a turntable. When ashpans or smokeboxes have to be cleaned, the ashes are disposed of by the

simple method of dropping them through holes in the flooring into the sea, and drivers have to be careful when oiling their engines that they, too, do not take an involuntary bath!

The station has a complete loudspeaker system, and arriving steamers are greeted with a cheery "Good morning" followed by details of the next trains, and altogether the impression made by this unusual terminus is a pleasant start to an Island holiday.



Driver filling Westinghouse pump lubricator of "Fishbourne."

Dare-devil Feats

Inimitable Stunts of Famous Circus Artists

By M. Lorant

CIRCUS performers have greatly developed their art during the last decades. Their performances are on a higher level of skill than were those of the last century, and the artistic standard also has become considerably higher since artists of repute no longer have any prejudice against appearing in circus or vaudeville shows. In spite of the general higher standard and development of this kind of show, however, there are some famous "numbers" that have remained unique, some personal achievements that never have been and never will be repeated by other artists.

Many famous circus "stunts" that have taken away the breath of audiences in their time cannot now be performed and have not been outdone by imitators since. In some cases the inventor of the act died without revealing his secret to others, and so the act could not be repeated. Often the physical strength or skill necessary could not be attained by other artists, or perhaps the particular personal qualifications, either physical or mental, existed only in the artist who created the trick.

One of the most sensational stunts of the 1880s was the performance of Miss Aimee, the "Human Fly," who astounded spectators by walking head downward on a board fixed to the ceiling. She trod

gingerly on the board, her long hair hanging down and her arms outstretched, as calmly as if she were walking on the ground, instead of on the ceiling. Miss Aimee jealously guarded the secret of her astounding stunt; all that transpired was that she used special shoes with a kind of pneumatic sole.

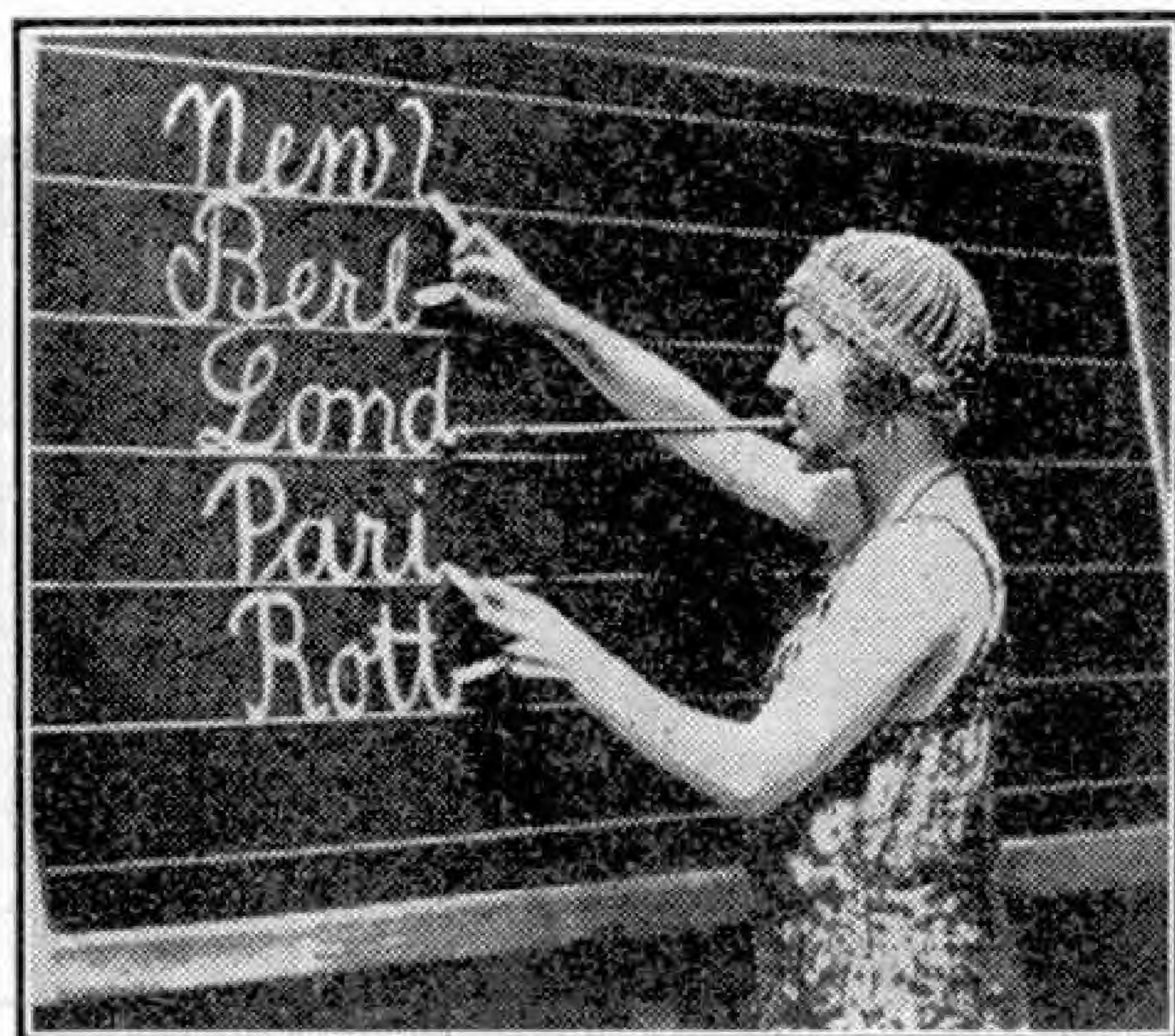
Although night after night the spectators watched her in terror, fearing that she might hurtle to the ground from her unnatural and perilous position, she never had an accident. She died a natural death and took her secret with her. Her first imitator, who tried the same act wearing shoes with pneumatic soles, fell to the floor of the circus and died on the spot. Since that time this stunt has not been repeated; apparently nobody has dared to undertake it.

Another astounding act that has never been repeated by any tamer of wild beasts was the somersault performed by an elephant. The big animal was trained by a negro, Ephraim Thompson. He was a man of gigantic height, who had such a frightful temper that no one could bear with him for long; but Mary, his elephant, seemed to dote on him. The huge beast's stunt was to mount a tub, gracefully poise, somersault and finally land on her feet.

Thompson used a cleverly constructed and completely hidden spring that gave the elephant its starting swing. Others have tried the same trick and have failed, either because their elephants were not so well trained or because the spring apparatus did not work well.



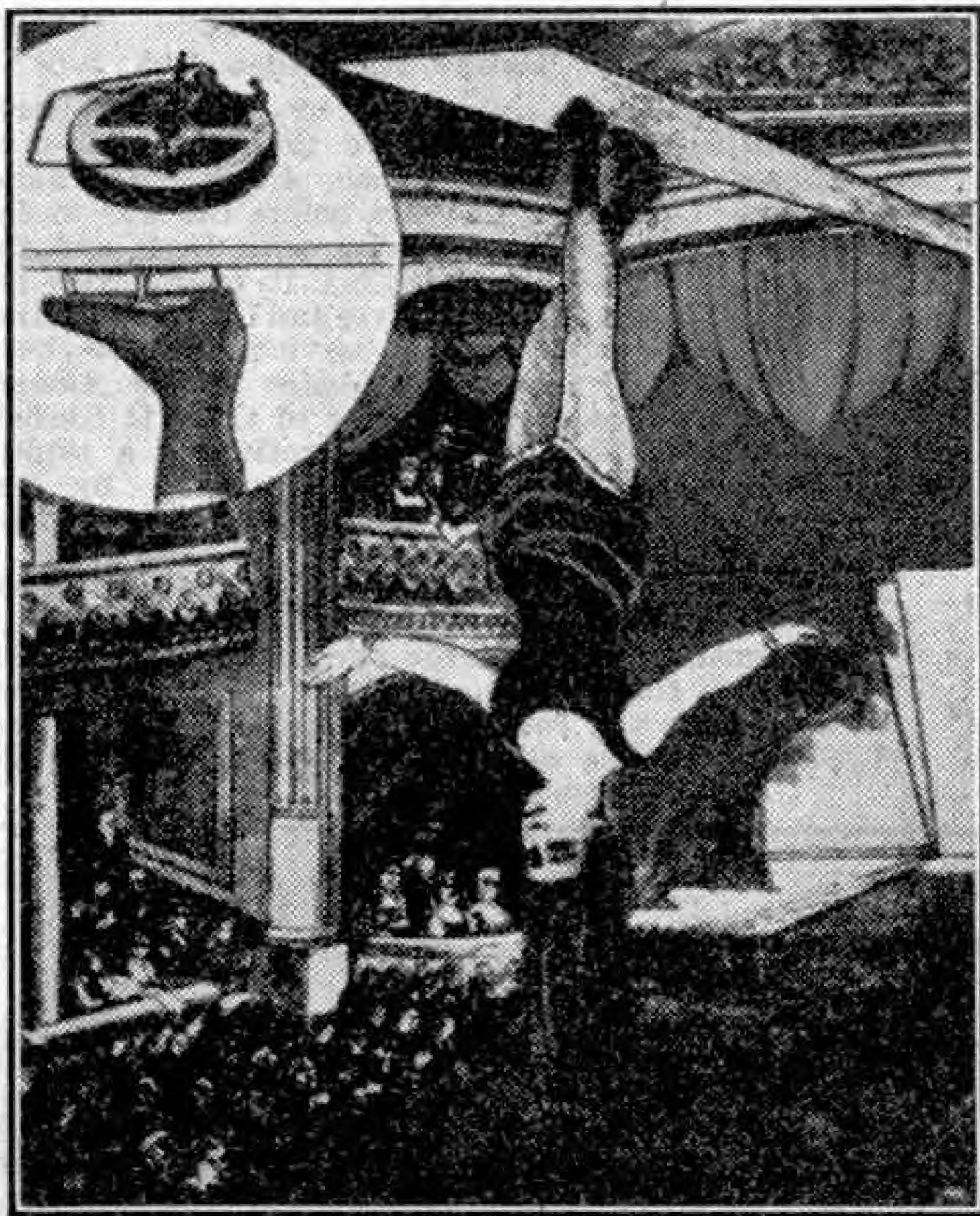
A perilous spiral climb.



Thea Alba writes the names of five different cities at once.

The negro made vast sums with this trick. He owned the biggest and most beautiful diamonds ever possessed by a circus showman.

A very artistic and unique stunt was the one performed by a Rumanian, La Roche, who became famous all over the world for his clever and difficult act. A pole about eight metres or 26 ft. high, with a narrow iron ledge running around it in spirals to the top, was brought into the ring. A big ball, about one metre or rather more than a yard in diameter,



Miss Aimee, the human fly, who walked on the ceiling. No other circus performer has ever accomplished this feat.

was placed at the bottom of the spiral. Slowly that ball began rolling upward without being moved by any outwardly visible force. With breath-taking slowness, it mounted upward along the narrow ledge. Sometimes it would stop for a moment and tremble, and it seemed as though it would immediately roll down again; but then it always continued its perilous journey up the narrow spiral, landing at last at the top of the pole. Then it opened, and out of it stepped La Roche, gaily swinging a flag. After bowing to the applause he again shut himself in his ball and rolled slowly down.

No one has been able to perform this act since; no one knew La Roche's secret of moving the ball from the inside, an

acrobatic stunt that demanded unparalleled skill. It certainly needed tremendous training and concentration to be able to roll up the narrow spiral ramp without missing the sharp twisting curves. Had he made a mistake or miscalculated the distance, he would have been hurled down, as were those imitators who tried to perform the same stunt. They all rolled off when passing one of the curves near the top and were severely injured. La Roche himself died on board ship when returning to Europe from a tour in South America. He was buried at sea and took with him the secret of his unique performance.

The amazing act of the famous equilibrist family "The Uessems" is not unique in itself, but needs such an extraordinary amount of skill, strength and balancing ability that it has never been repeated by imitators or pupils. One of the Uessems stood upside down, with his head resting on that of another man standing on the ground. The man with his legs towards the ceiling held a horizontal pole fixed to his feet, and made it swing round with rhythmic movements of his feet. At the ends of the pole were children, who flew round in circles as if they were on a merry-go-round. The extraordinary difficulty and danger involved by this trick has deterred people from trying to imitate it.

There are circus stunts that do not depend on any secret trick or clever idea, but simply on some supernormal mental or physical ability peculiar to the performing artist. The athlete Rasso, for example, who made audiences gasp with admiration at the end of the 19th century, could stand on a high platform with a hole in the middle of it and support another platform, hung on chains from his neck, that carried a complete orchestra. Marinelly, the snake man, who was abnormally supple, could contort himself into incredible postures, as though he had no bones whatever in his body. Although strong men and snake men are common in every circus or show-company, no one has ever surpassed the achievements of these two.

Sometimes it was an extraordinary mental capacity that distinguished an artist and raised him or her far above others in that profession. Thea Alba, a fair-haired young woman, was outstanding for her ability to do several things at once. For example, she wrote on a blackboard five (Continued on page 46)

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, and certain others that will be indicated, these should be ordered through a bookseller.

"THE BOY ELECTRICIAN"

By J. W. SIMS (Harrap. 8/- net)

This book is an old favourite in new form, fully revised and brought well up to date, with a completely new set of half-tone illustrations. Electricity continues to play an ever-increasing part in our daily lives, and there is no boy who does not wish to learn as much as he can about it and its applications. Mr. Sims is an excellent guide. He gives the necessary instructions for a vast range of experiments with simple apparatus; these can be guaranteed to work because they have all been carried out by boys, and the problems and questions associated with them have been carefully studied. Thus a reader who follows the book through gains a really practical knowledge of electricity and its working.

The subjects range from simple facts about magnets, static electricity and electric currents, to the construction of a small dynamo, motors of various kinds, bells, telegraphic instruments, a simple telephone and an induction coil. Radio, miniature lighting and the discharge of electricity through vacuum tubes are among the other subjects that are dealt with, all by way of experiment with adequate explanation. Throughout excellent use is made of drawings, chiefly illustrating the construction of apparatus.

"AIRCRAFT OF THE FIGHTING POWERS," Vol. VII

Edited by D. A. RUSSELL, M.I.Mech.E.

(The Harborough Publishing Co. Ltd. £1/11/6 net)

With the publication of this, the seventh and final volume of "*Aircraft of the Fighting Powers*," the series provides a comprehensive record of every type of aircraft used in the Second World War. The new volume maintains the high standard attained in the earlier ones, and deals with all types of machines flown in the last year of the war. In each case there is a detailed operational history and full specification of the machine, together with the familiar 3-view 1/72 scale drawings and splendid half-tone photographs for which these books are noted. It is beautifully printed on art paper, and includes an Index for the complete set of volumes.

"ENGINEERING WORKSHOP MANUAL"

By E. PULL

(Technical Press Ltd. 7/6 net)

Here is yet another edition, the 11th, of Mr. Pull's invaluable manual. The object of this is to provide the apprentice, improver and beginner with enough practical information to enable him to take an intelligent and useful interest in the various branches of workshop practice. It has met the needs of thousands of young engineers during their training periods, and has been adapted for use in Government Training establishments and the Services Educational Scheme, and by many educational authorities and a number of engineering firms—all evidence of its value.

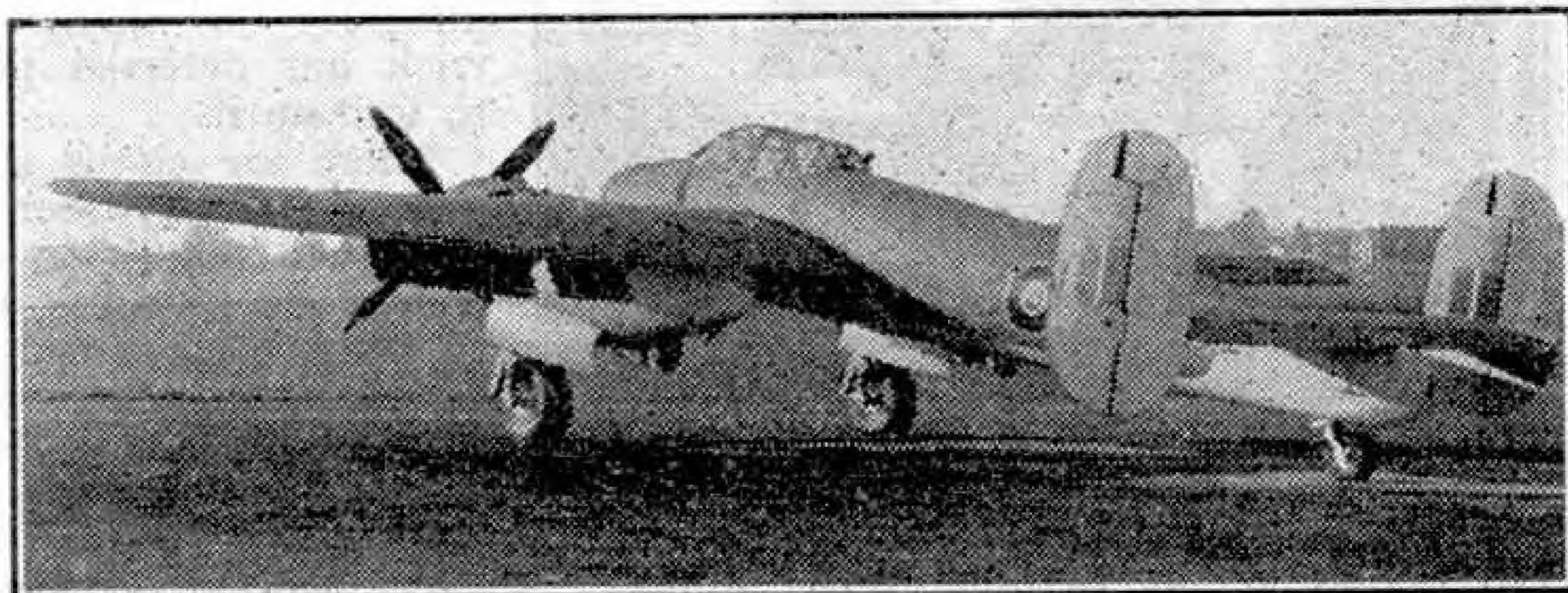
In the present edition the chapter dealing with the materials with which the engineer works has been specially revised and brought up to date, and this has been done where necessary in other sections of the book. Every phase of engineering practice is dealt with, from workshop calculations to tube and strip metal bending, and the directions given are clear and concise throughout. Excellent use is made of drawings and photographs, and an extensive set of tables completes a very valuable manual.

"GOLDEN ARROW ALBUM"

By GEORGE C. DRURY (Ian Allan Ltd. 1/6)

Of all the boat trains run by British railways probably none is better known than that queen of Continental services, the "*Golden Arrow*." The name was applied for some 10 years before the war to the Pullman service linking London with Paris and the Continent by Southern and S.N.C.F. trains, with the famed Channel Passage via Dover and Calais separating the two rail journeys. The service has now been restored, and Mr. Drury's "*Golden Arrow Album*" has been produced as a souvenir of this. It consists of a series of illustrations descriptive of a typical "*Golden Arrow*" journey, accompanied by the author's commentary and prefaced by an apt foreword by O. J. Morris.

The illustrations include both outside and inside shots of the train and of the elegant "*Canterbury*," the steamship that links the two railways concerned. Apart from their technical interest the pictures serve to emphasise the ease and comfort of the journey. Typical questions relating to the service that will



Bristol "Brigand" I long-range "strike" aircraft. An illustration from "*Aircraft of the Fighting Powers*," Vol. VII, reviewed on this page. Photograph by courtesy of Bristol Aeroplane Co. Ltd.

arise in the minds of intending passengers also are answered in the booklet, so that the album is both attractive and informative enough to appeal to railway enthusiasts and many others.

Copies of the booklet can be obtained from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 1/8½ post free.

"THE STAY-AT-HOME BOOK"

By CAPPY DICK (Torchstream Books. 7/6 net)

This is a "How to Make" book of a novel type intended for junior readers. In it directions are given for making some 150 gadgets. The materials required can be found in every home, and they are worked up with the aid of such simple tools as a pocket knife, a pair of scissors or a bit of paste, to produce a variety of knick-knacks, toys and games, all of which will provide amusement and recreation for

rainy days and for other times when boys and girls cannot look for their fun out of doors. Good drawings illustrate the articles to make, and show stages in their production, and those who explore the book will be surprised to discover what a wealth of interest there is in simple materials in their homes.

"CAMOUFLAGE OF 1939/42 AIRCRAFT"

By OWEN G. THETFORD
(Camouflage Publications Ltd. 8/6 net)

This book deals with machines in service during the first half of the recent world war, and will be followed by a volume covering the 1943-5 period. It will be of great value to the model aircraft constructor who is keen on accuracy of detail and finish, and to those interested in aircraft camouflage schemes and insignia as a branch of the history of aeronautical warfare.

Every type of aircraft used in the R.A.F. and Fleet Air Arm during 1939-42 has been dealt with individually, with details of appropriate code squadron letters and lists of manufacturers' serial numbers. Full details are included of all British, American, Russian, French, German and Japanese camouflage schemes, and those of some of the smaller countries which took part in the war, with 4-view coloured drawings specially prepared by Mr. C. Rupert Moore, A.R.C.A., after several years of research.

"MAKING MINIATURE ROAD VEHICLES"

By J. T. HILL (Modelcraft. 3/6 net)

Mr. Hill's purpose is to help the model builder who is interested in miniature road vehicles. The making of these is in itself a fascinating pastime, and the models can be used with advantage on miniature railway layouts. The scale selected is 4 mm. to a foot, so that the models can properly be included as accessories in a Hornby-Dublo layout, and the tools and materials required are of the simplest character.

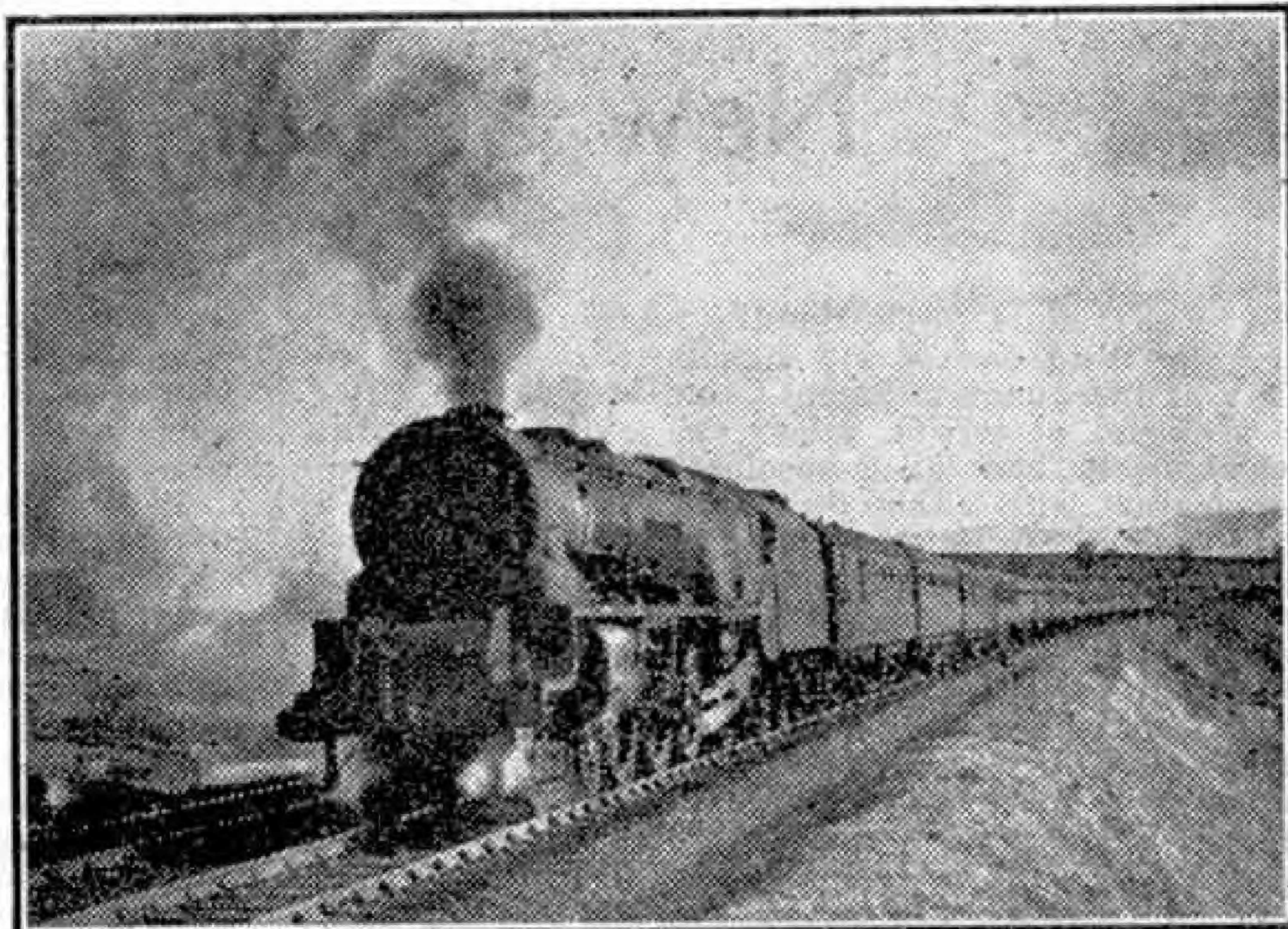
The instructions throughout are definitely practical and systematic. We start with the chassis, passing on to the design and construction of bodies of all kinds, including those of buses and other special vehicles; and this is followed by good advice on details of various kinds and the making of wheels without the use of a lathe. Painting and lettering, loads and layouts, complete an interesting booklet, which is well illustrated by useful drawings.

Copies of the booklet may be obtained direct from Modelcraft Ltd., 77, Grosvenor Road, London S.W.1, price 3/8 post free.

"SUBMARINE CITY"

By ERROLL COLLINS (Lutterworth Press. 7/6 net)

The author of this book can be relied upon to provide his readers with an exciting story with an ultra-modern touch, and he has done this well in "Submarine City." The city itself is a wonderful marine observatory on the bed of the Atlantic, a mile below an artificial island that serves as an air base. A band of foreign treasure hunters seize the air base and the city, but this is only the beginning of the excitement. In the course of the warfare that follows we visit the old pirate city of Port Royal, long sunk beneath the waves; find oil wells on the ocean bed; and penetrate into the ancient temples, overgrown with weed, built ages ago by the people of Atlantis. Wonderful craft that are at once submarines and aeroplanes figure prominently in the exciting struggles by which the modern pirates are thwarted, and the story ends, as all such stories should, with the recovery of long-lost treasures. There is a coloured frontispiece.



L.M.S. No. 6230 "Duchess of Buccleuch" climbing Shap with 16 coaches. This illustration, from a photograph by Canon E. Treacy, M.B.E., appears in "My Best Railway Photographs," reviewed on this page.

"MY BEST RAILWAY PHOTOGRAPHS— No. 1, L.M.S."

By REV. CANON E. TREACY, M.B.E.
(Ian Allan Ltd. 1/6)

The Rev. Canon Treacy is well known for his splendid photographs of locomotives and trains, several of which have been published in the "M.M." Here we have a collection of what he considers his best L.M.S. pictures, with interesting general remarks concerning his railway photography and notes on his cameras and methods of using them. There are interesting remarks on some of the photographs, notably a fine effort showing the "Duchess of Buccleuch" climbing Shap, and the author challenges criticism by expressing his belief that the rebuilt "Royal Scot" is the most handsome engine at work in Great Britain to-day.

All train enthusiasts will be delighted with the splendid photographs reproduced, which include the striking light-and-shade view in Edge Hill cutting that formed the basis for the cover of the October 1944 "M.M." Those who are photographers as well will be even more pleased, and will study keenly the table at the end of the book giving details of camera, lens, stop, exposure, type of plate or film, and the developer used for each photograph in the series. Altogether a delightful and helpful booklet.

Copies can be obtained from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16., price 1/8½ post free.

"ROMNEY, HYTHE AND DYMCHURCH RAILWAY"

By CECIL J. ALLEN, M.Inst.T., A.I.Loco.E.
(Ian Allan Ltd. Price 6d.)

Every reader of the "Meccano Magazine" has heard of the Romney, Hythe and Dymchurch Railway, the 15 in. gauge line which is situated on the Kent Coast, and is the smallest public railway in the world. Mr. Allen gives not only the story of the railway from its beginning, but also interesting details regarding the development of railways of this narrow or miniature gauge. Summer and winter train services are given and there is a table of locomotive details. The illustrations, of which there are 15, include R.H. and D.R. locomotives, trains and various views along the line.

The booklet should find a place in the collection of every railway enthusiast. Copies can be had from A.B.C. Locomotive Books, Mail Order Department, 33, Knollys Road, Streatham, London S.W.16, price 7d. post free.

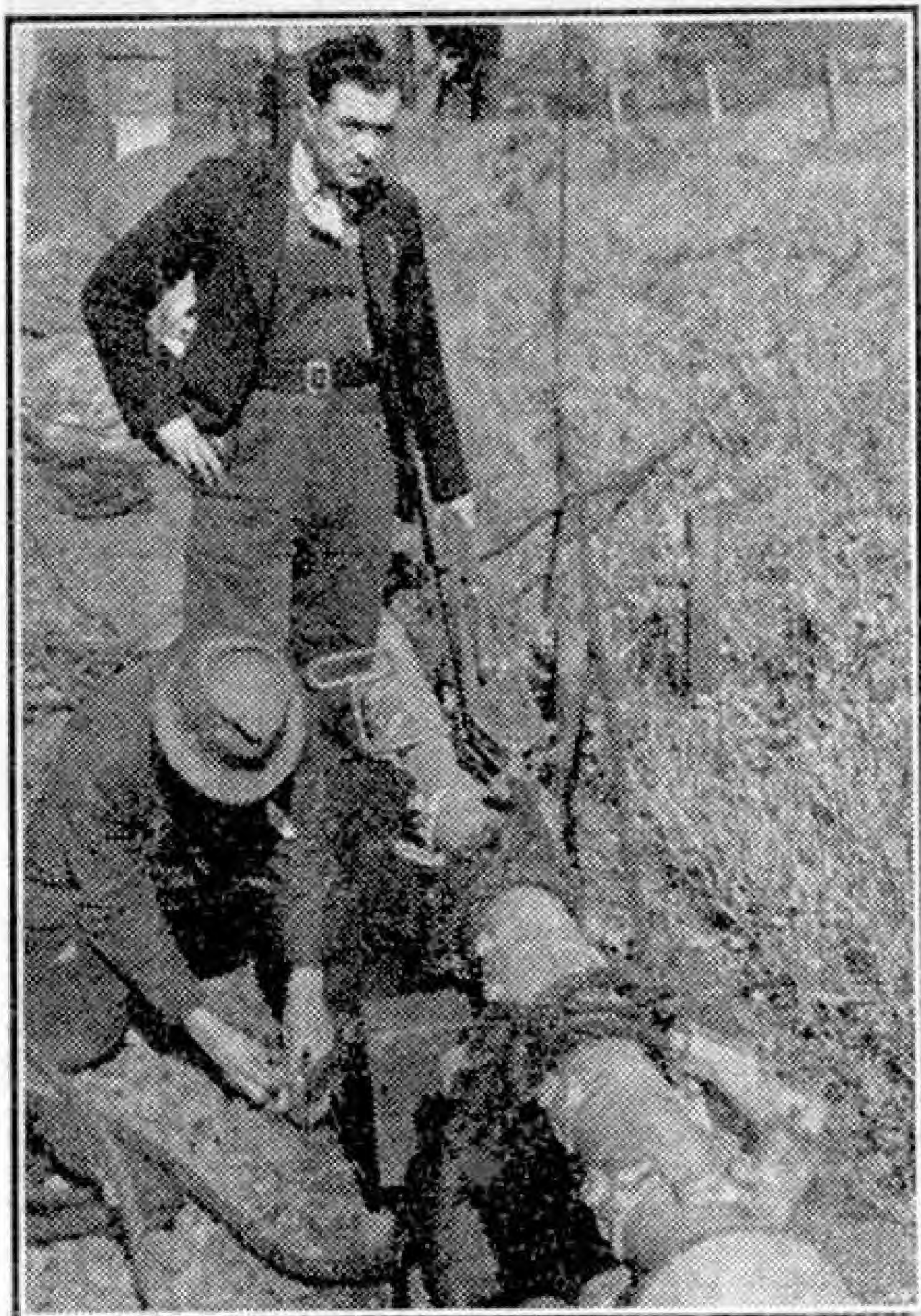
New Signals for Old

By "S.M."

"A FINE start for a Monday morning."

So said one of my signalmen on taking up duty at the Junction Signal Cabin at 5.30 a.m. after a week-end of terrific gales. On trying the circuit telephone he had failed absolutely to get into communication with either of the signal boxes on each side of him, or with anyone else. To complicate matters still further, the block telegraph apparatus, both instruments and bells, had also failed. There is, of course, a regulation to cover these circumstances; but that is another and a very long story.

The signalman then began to look round into the blackness outside and noticed that, after returning his signal levers to "danger" position, the back lights for his "up" home gantry could not be seen.



A new tubular signal post ready for erection. The foreman makes final adjustments to the ropes by means of which the post is raised into position.

These are the circular openings at the back of each signal lamp casing, which indicate at once the position of the semaphores after sunset, and show if the lamps are still burning or not. He immediately took his handlamp and went forth to investigate. The cause of the various failures was soon found; the gantry was no more.

Wait! Yes, it was still there; but no longer standing upright. It had snapped off nearly at ground level. Luckily it had fallen, not across both lines as it might have done, but into the adjoining field. There it lay dejectedly, but, miraculously, with one lamp still burning, with the casing twisted so that no light could be seen from the cabin. In its final crash to earth the signal ploughed its way through the telephone and other wires that pass close to it, and it

was the breaking of these that had caused the failure in communications. The L.M.S. Signal and Telegraph Department was soon "on the job," the signal was temporarily replaced, and normal working was resumed.

It was then, in the course of a conversation with the Inspector of that department, that I learned that my Junction was "programmed" for a complete renewal of all signals. It was duly announced through official notices that the work was to be undertaken and completed in three days. Two days before the date given, the new tubular steel signals arrived, complete with everything else needed, including a travelling workshop and messing car for the gang. The new signals and all materials were loaded on what we call on the L.M.S., a bogie bolster truck; and as one of the signals was a very long one, this truck had coupled to it a single bolster truck to act as "runner" or "check." On the day before the work was to begin, the gang arrived to unload the signals and materials, and so release the much-needed rolling stock for further traffic of like character. The new signals and the materials were transported to their respective sites by means of the platelayer's trolley, between trains as opportunity offered.

All was ready, and I had asked the foreman in charge of the work to let me know in good time when they would start with the actual erection of the new signals. However, one of his messages to me was not delivered until too late, and I was not present when the old gantry, which had succumbed to the westerly gales, was replaced by a new steel post.

I had ample warning about the next one to go up, and was on the spot in good time, with my camera at the "ready." Some of the results are shown in the accompanying illustrations, which are typical of the sequence of operations. The picture on this page shows the foreman making the final adjustments to the ropes for hoisting the new post into position. Now let the views on the next page tell their story.

The old signal (Fig. 1) is used as a derrick to raise the new signal. The latter, with the pit ready dug for the base, can be seen at the foot of the old signal. Ropes and pulley blocks are ready.

The men heave (Fig. 2), while one stands ready with a short ladder.

Now, for a moment, notice the concrete tube or surround into which the base of the new tubular steel post is inserted (Fig. 3). This tube is finally buried in the pit already prepared for it.

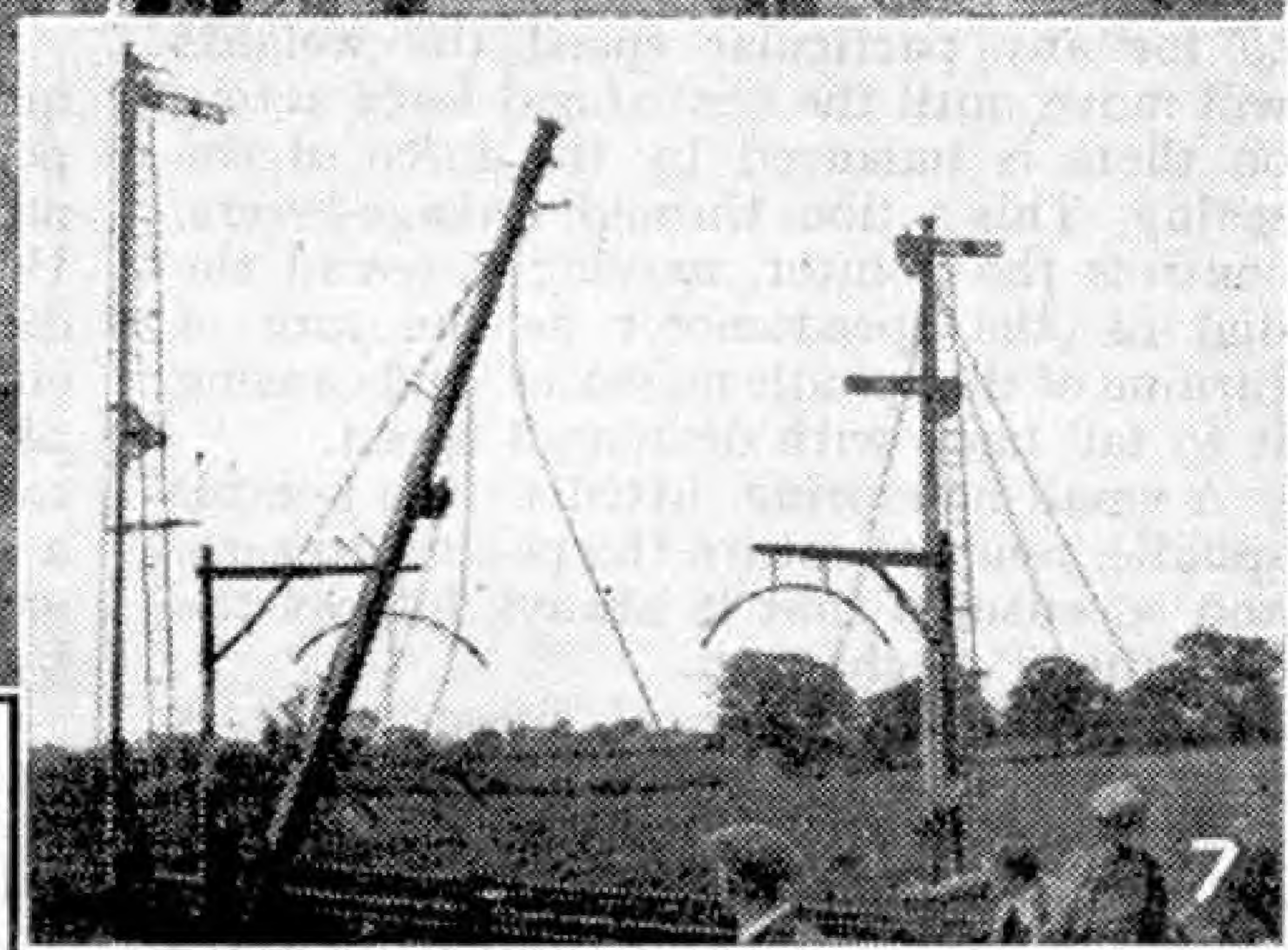
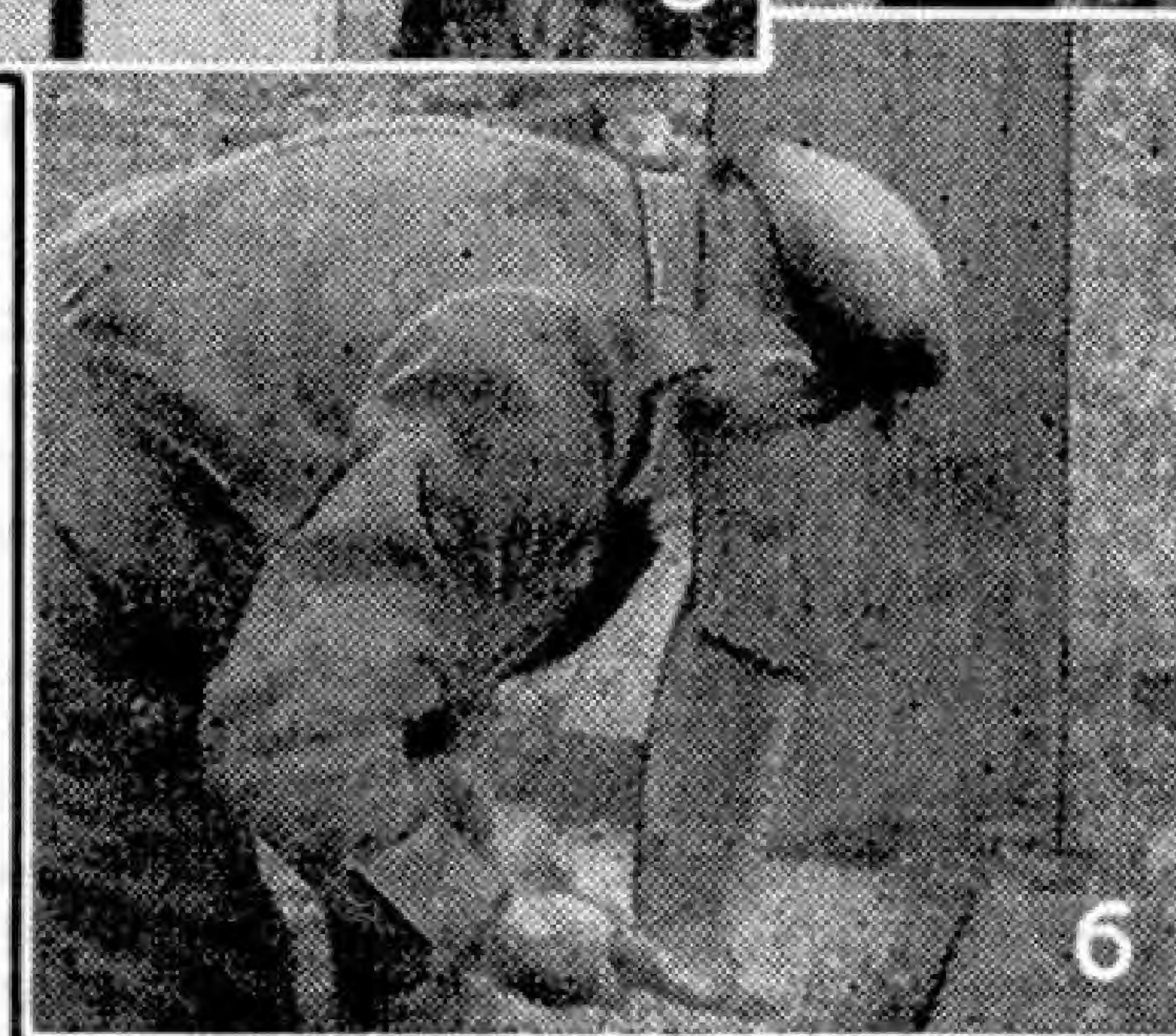
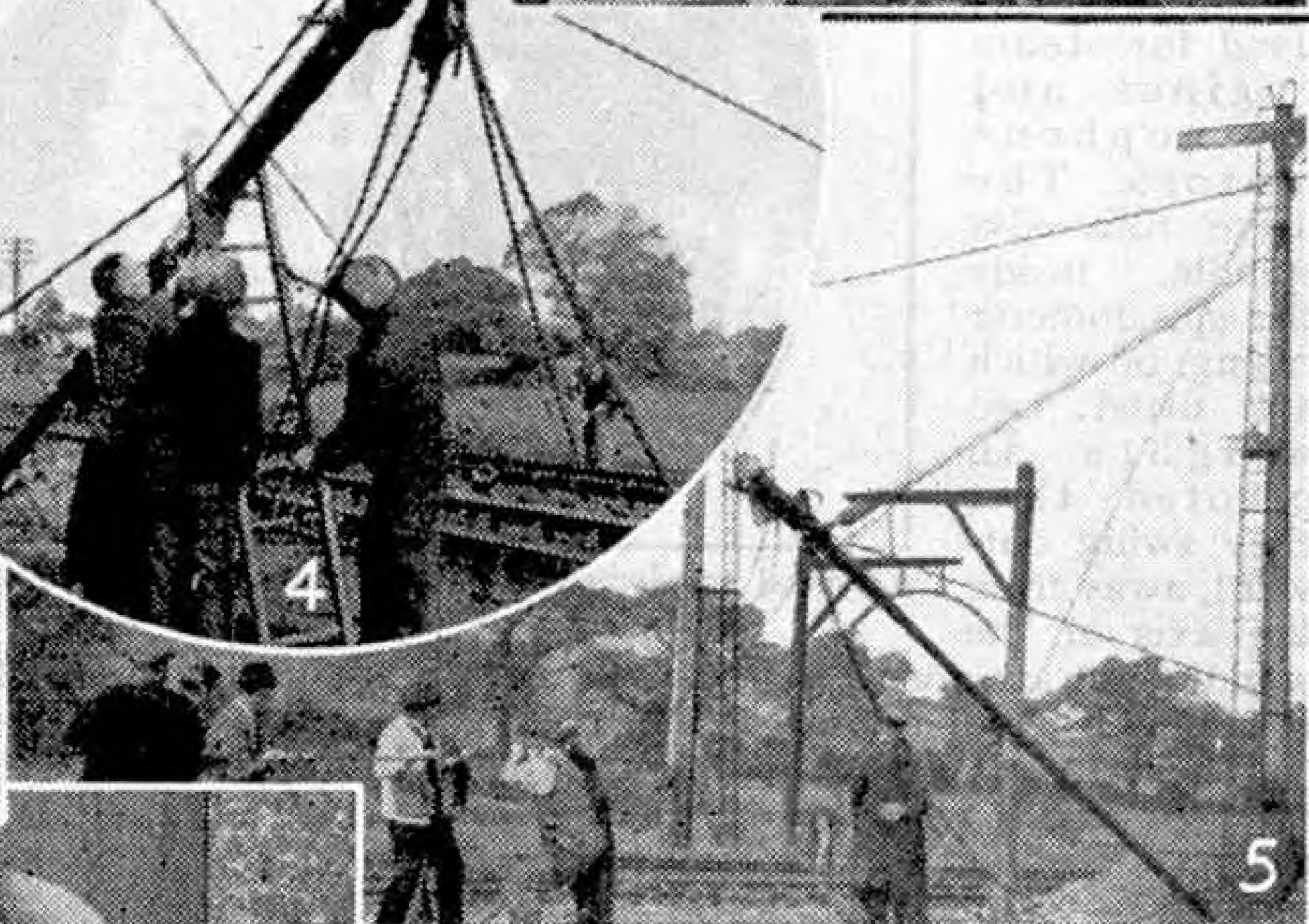
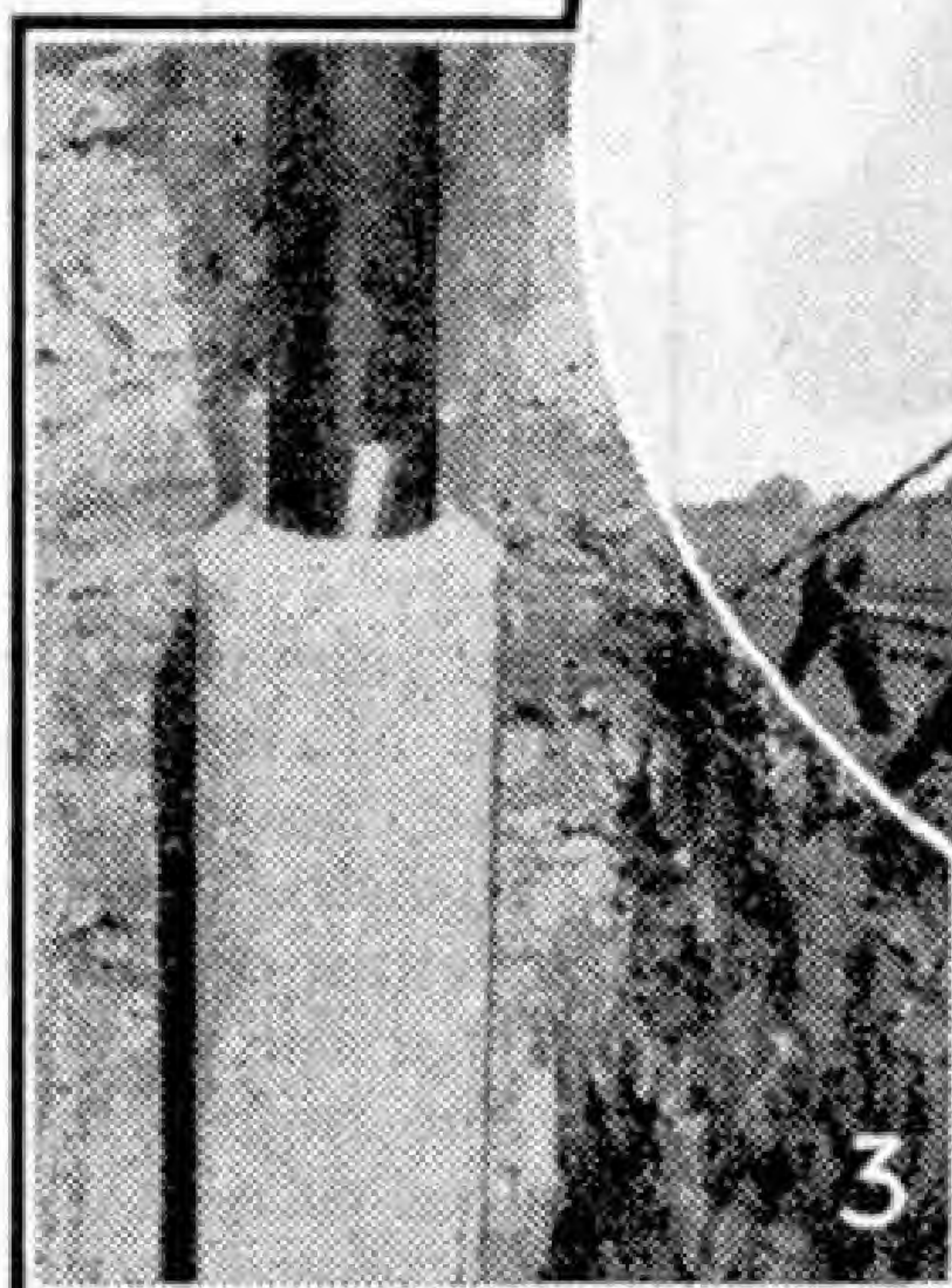
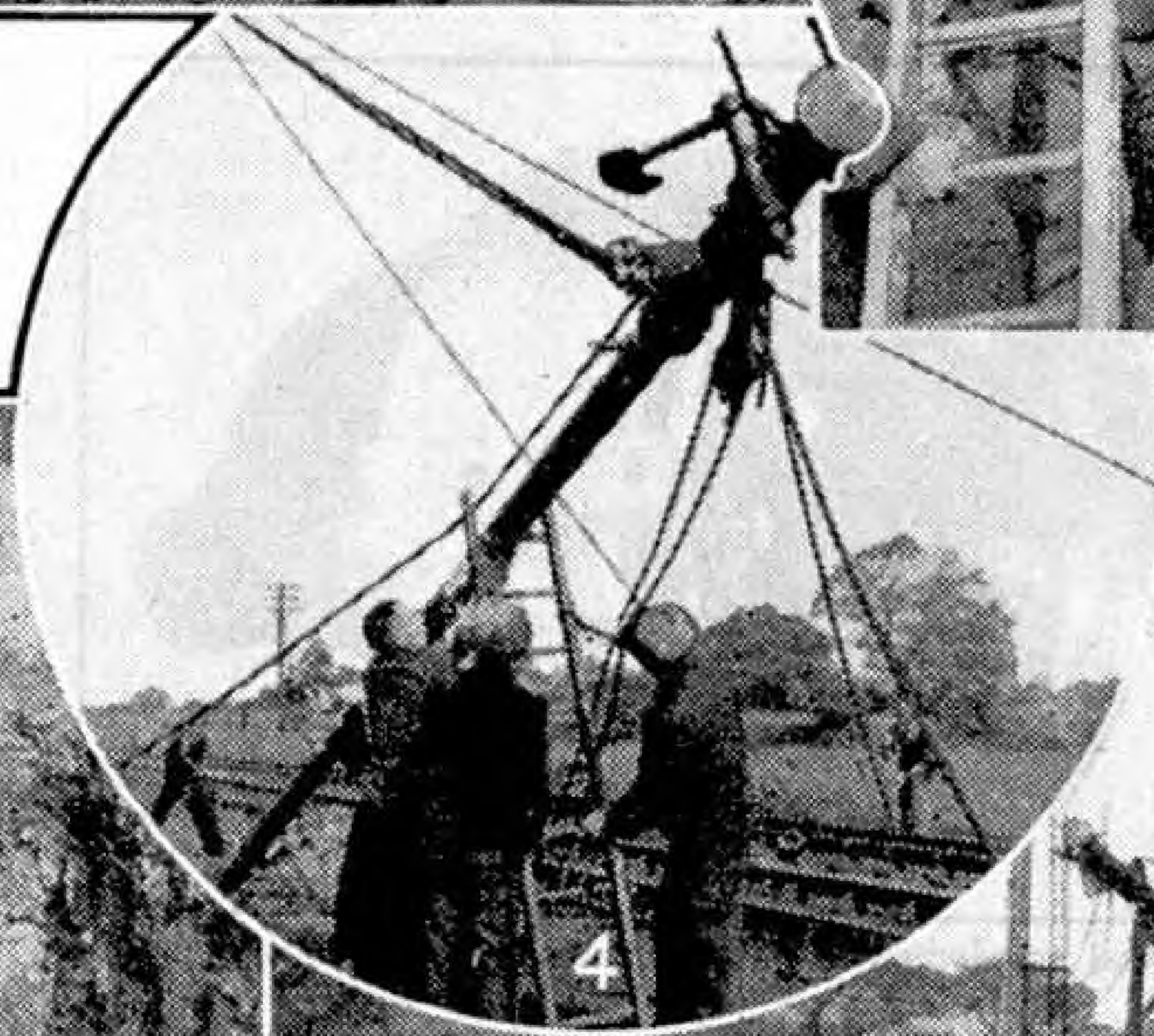
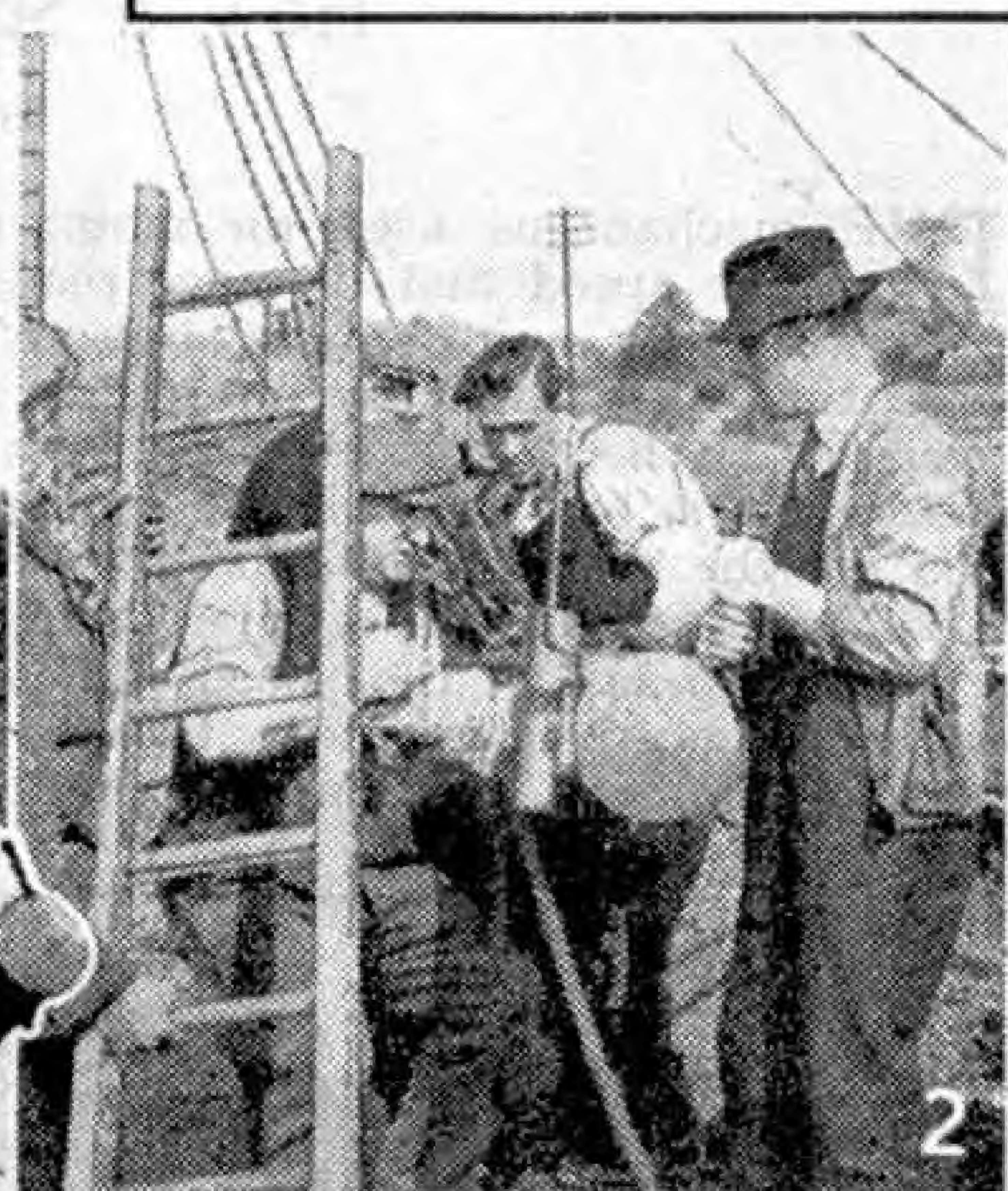
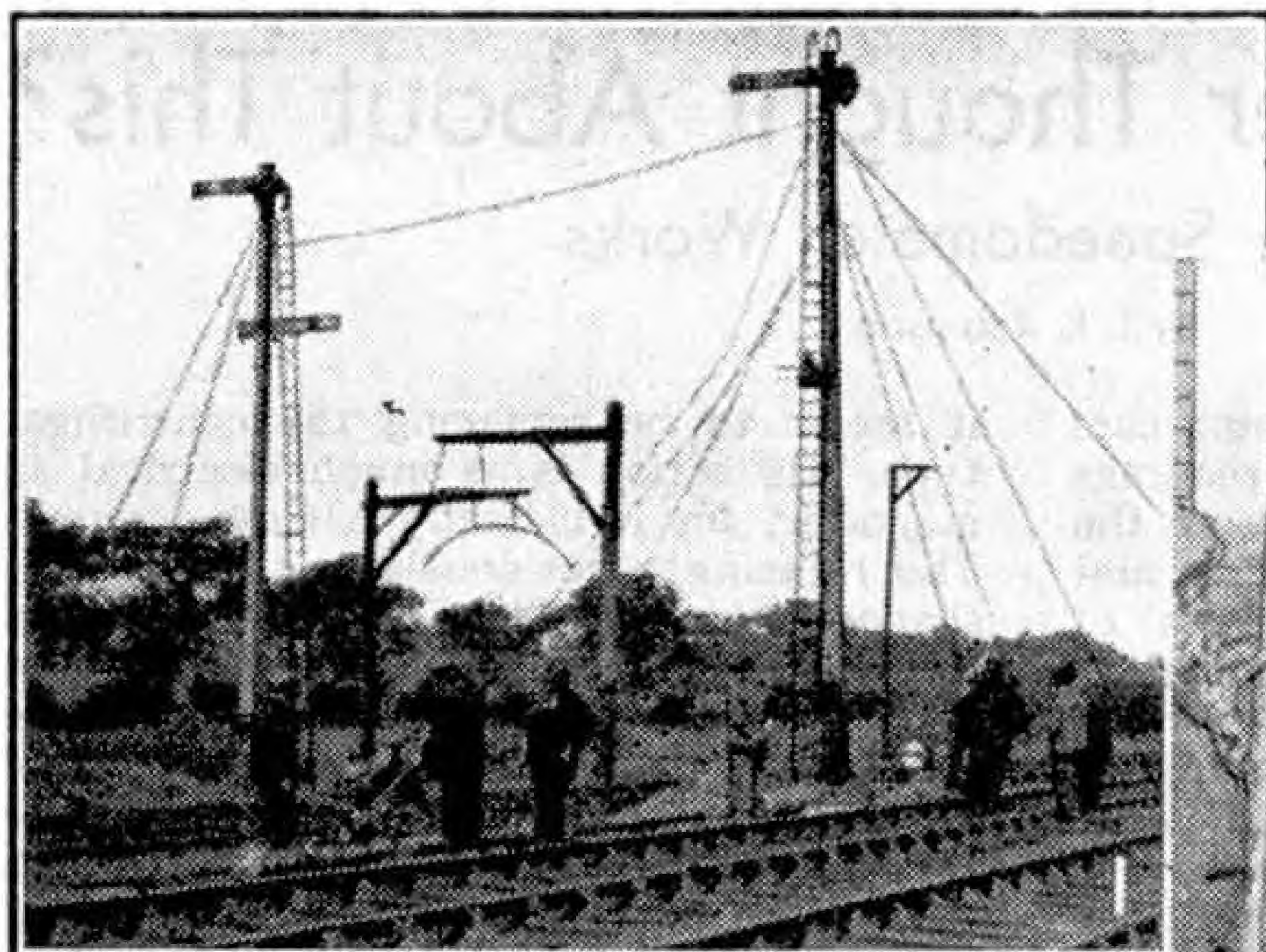
The first insertion of the ladder did not give quite enough purchase on the pulley blocks; so (Fig. 4) the process was repeated to gain a better angle, so that the pulley ropes could exert their lift.

So the new post is well in the pit and on its way up (Fig. 5), steadied by side ropes. It will be noticed that the new signal post is higher than the old. This is to give drivers a more distant view of the signals than the old one afforded. Final jobs included fitting the arms, wiring up, fitting and wiring new electrical repeaters, and testing.

Now, you may ask, what happens to the old signal posts?

The old junction signals were felled, much in the same way as a tree is felled. Two of the men, using a cross-cut (Fig. 6) saw make a "V" facing the direction in which it is decided that the post shall fall. Then (Fig. 7), "Look out, here she comes!"

I should have liked a happy ending, but it was not to be. There was a very high wind when the post was felled, and the margin for errors was very small. At all events, the post crashed down and made a sorry spectacle of a dwarf or ground signal, smashing it quite beyond repair; but it was replaced by a new one next day.



Have You Ever Thought About This?

How a Speedometer Works

By T. R. Robinson

THE mechanisms used on motor cars to give speed and distance readings are both really quite simple, but at the same time they are very interesting and ingenious. There are several types of speedometers, but the two most generally used are the "centrifugal" and the "magnetic." These work on entirely different principles so far as the speed indicating mechanisms are concerned, though the mileage counting portion is much the same in both.

In the centrifugal type of instrument, the action is very similar to that of the governors used for steam engines and gramophone motors. The drive rotates a spindle, inside the speedometer casing, on which are fitted two weights so pivoted that they swing outward, away from the axis of the

spindle, but are normally held close against the spindle by the action of a light spring.

When the movement of the car rotates the spindle, centrifugal force tends to make the weights move outwards. This movement is opposed by the spring, and so for any particular speed the weights will move until the centrifugal force acting on them is balanced by the force of the spring. This action, through linkage-levers, controls the pointer, moving it round the dial of the speedometer as the rate of turning of the spindle increases, and causing it to fall back with decreased speed.

A small hairspring, fitted to the pointer spindle, tends to return the pointer to zero, and so ensures that it always follows the centrifugal mechanism.

The magnetic type of speedometer is somewhat simpler in construction, its rotating parts are lighter, and it is generally more compact. For these reasons,

it seems to be replacing the centrifugal type. Its action is as much electrical as magnetic, for it is really a tiny dynamo. The rotating parts consists of a flat bar-shaped magnet. Close beside this is a thin aluminium disc that has its edge turned over, so that it resembles a shallow tin lid in which the poles of the magnet are enclosed. Attached to the spindle of the aluminium disc is a hairspring, which operates in a very similar manner to that

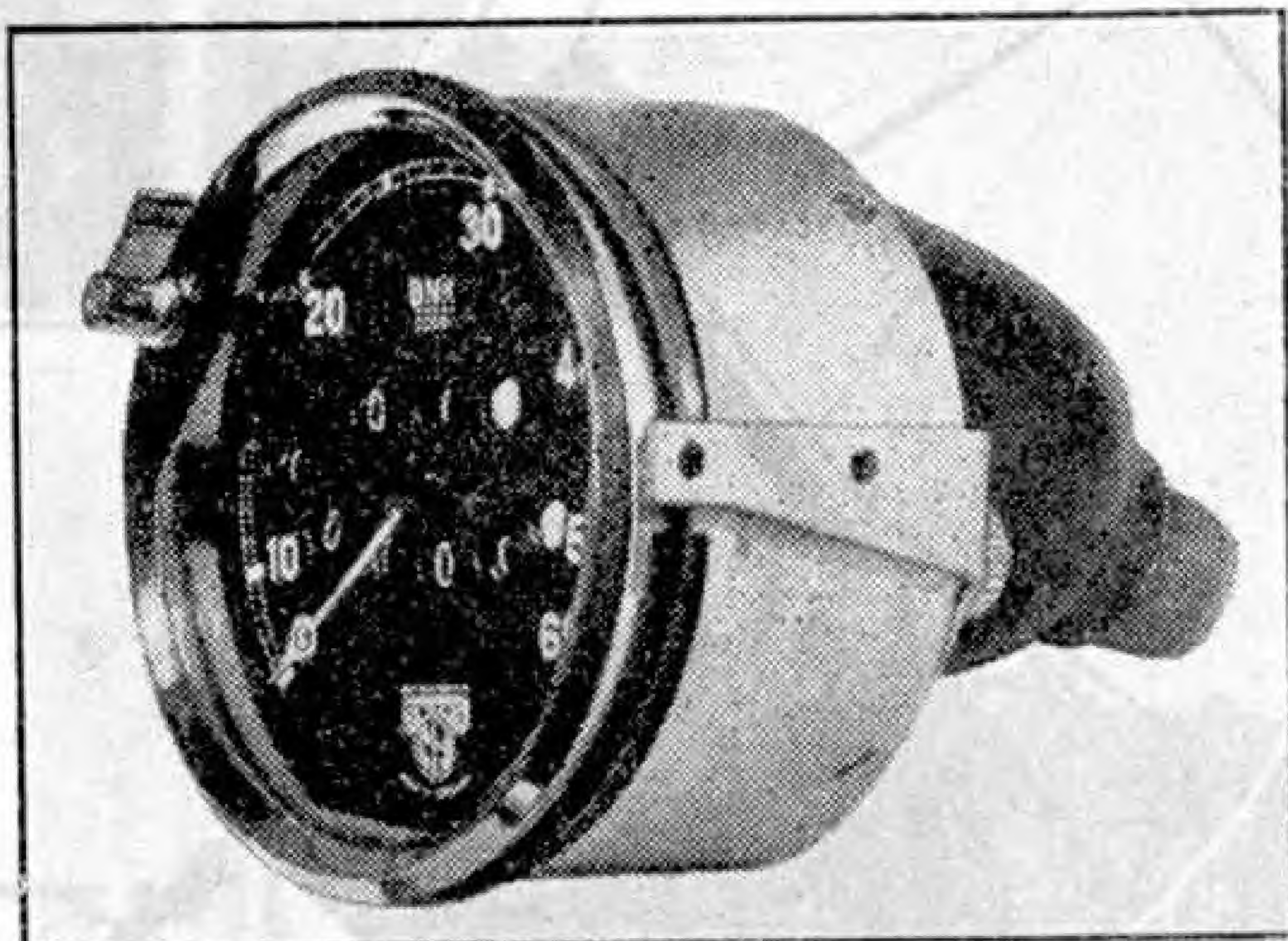
used on the pointer spindle of the centrifugal instrument, except that instead of merely serving as a pointer return spring, it is set to turn the aluminium disc back to the zero position.

As the magnet is rotated by the drive shaft eddy currents are generated in the aluminium disc, and these cause the disc to attempt to follow

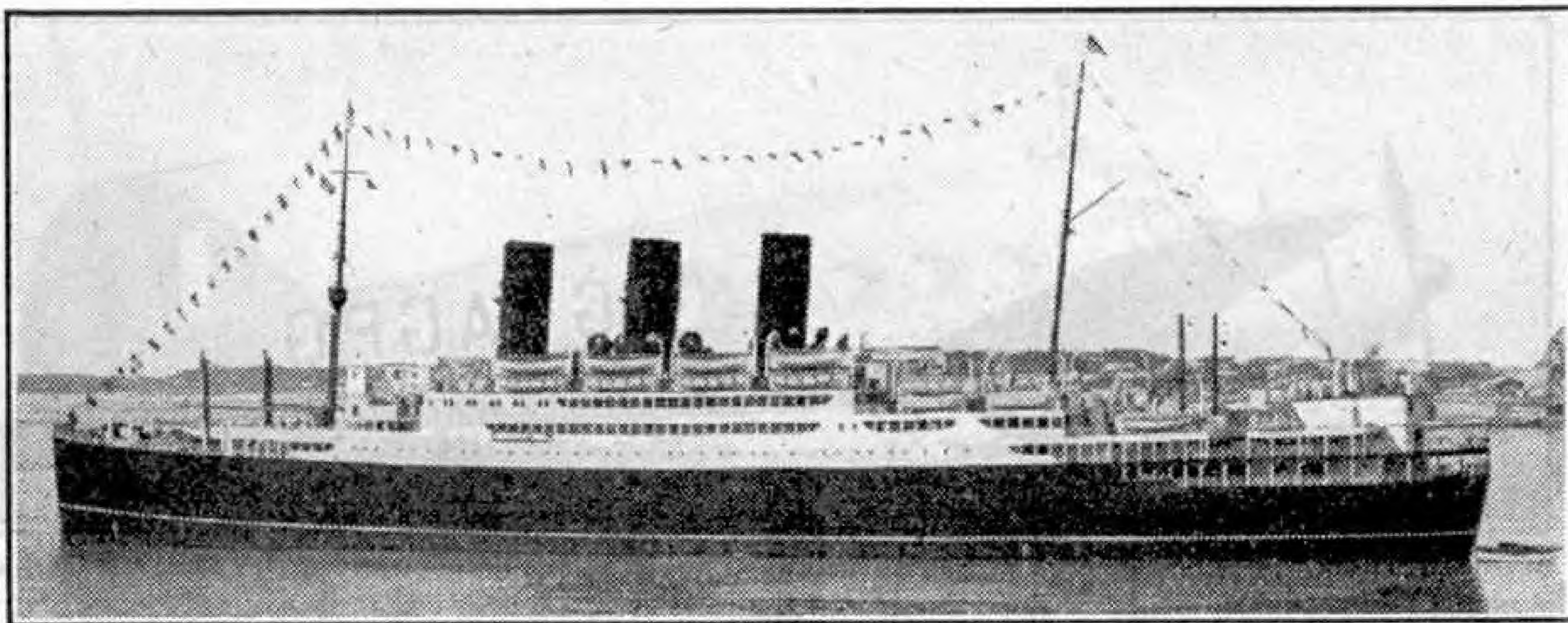
the magnet. The movement of the disc is checked by the tension of the hairspring, and so, for any particular speed of rotation of the magnet, the disc will move round until the forces due to the eddy currents and the spring tension balance.

The mileage counting mechanism is quite separate from the speed indicating portion, though it is driven from the same main spindle in both types of speedometer. Usually a worm on the main spindle drives a worm-wheel, to which is attached either a small eccentric or a tiny crank-pin. The rotation of the worm-wheel causes the eccentric or crank-pin to rock a small lever which, by means of a pawl, gathers the teeth of a ratchet wheel step-by-step, as the rocking action takes place.

The ratchet wheel drives the first numeral wheel of the mileage recording group, and each wheel drives the next one step as it completes one rotation.



A typical speedometer of the centrifugal type. Photograph by courtesy of S. Smith and Sons (M.A.) Ltd.



The Anchor Liner "Transylvania."

Anchor Line War Losses

By Denis Rebbeck, M.A., B.Litt., M.Inst.N.A., M.I.Mar.E.

TWO Anchor liners which were sunk during the war were flying the White Ensign, having been commissioned as armed merchant cruisers. These vessels were the "*Caledonia*" (renamed "*Scots-toun*") and the "*Transylvania*." They carried out their naval duties successfully until the middle of 1940, when both were sunk by enemy action within a period of two months, the "*Caledonia*" on 13th June and the "*Transylvania*" on 10th August.

The first Anchor liner to be lost whilst flying the Red Ensign was the "*Britannia*," which sighted a strange vessel at 7.45 a.m. on 25th March 1941. Capt. Collie altered course, but five minutes later all doubts as to the stranger's identity were removed when she opened fire. The "*Britannia*" however, dropped smoke flares and increased her speed as much as possible, at the same time returning the raider's fire. By nine o'clock it was apparent that the raider was a faster vessel; the "*Britannia*" was being hit repeatedly, she was on fire in several places and her gun had been put out of action. Ten minutes later the master hoisted a signal that he was abandoning ship, there being no point in unnecessarily jeopardising the lives of his passengers and crew. Even after the signal had been hoisted, however, the raider fired a further five rounds and two of these hit the "*Britannia*." When the ship had been abandoned, the raider quickly closed and sank her, after which the enemy vessel steamed off at full speed without making any attempt whatsoever

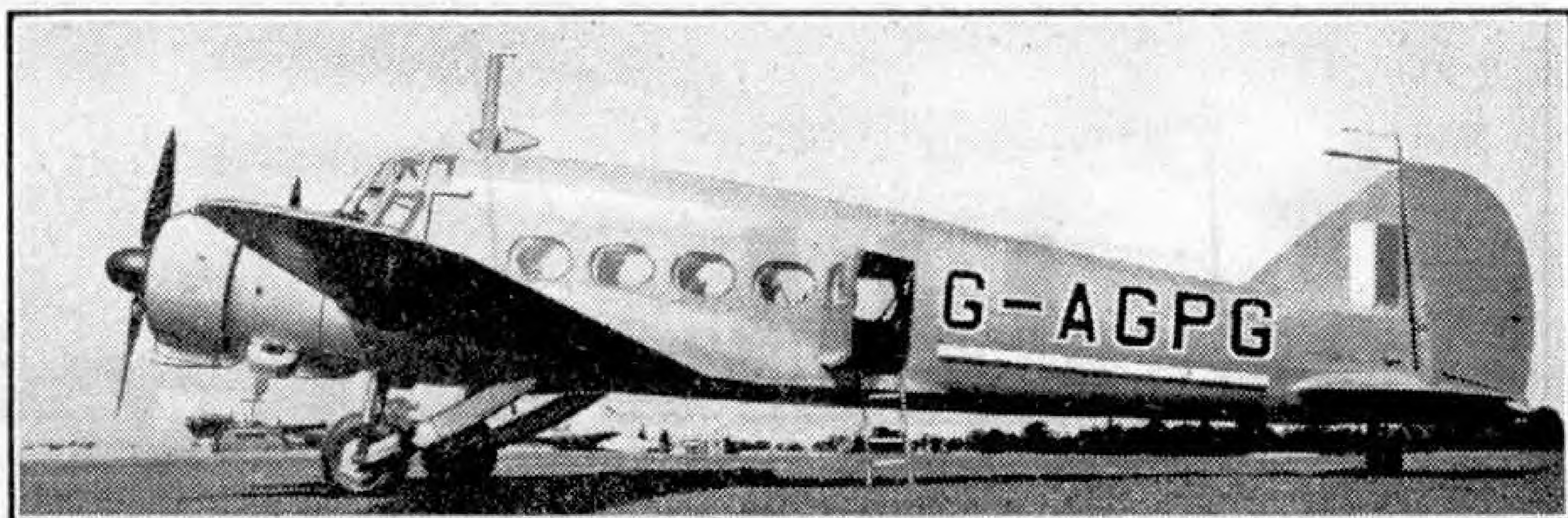
to pick up survivors or render assistance.

Another Anchor liner, the "*Elysia*," while on a voyage to India, via the Cape of Good Hope, was sighted on 5th June 1942 by two Japanese raiders, some 350 miles E.N.E. of Durban. At 7.50 a.m. the leading raider fired a warning shot, but the British liner, courageously ignoring this, altered course and dropped smoke floats. The first raider then made a signal "stop immediately," but Capt. Morrison steamed on at full speed for a further twenty minutes, by which time an enemy ship was on each quarter, about two miles off. Both enemy ships then opened fire and the "*Elysia*," which was hit somewhere aft, sustained some damage.

As the position was rapidly becoming hopeless, the master decided to abandon ship and made the appropriate signal by means of flags. After several more salvos the enemy ceased fire. The "*Elysia*'s" boats were lowered, and got safely away. An enemy seaplane then appeared overhead and dropped four bombs on the ill-fated liner. One bomb landed just abaft the bridge, the surface raiders meanwhile firing several more salvos. Three shells hit the ship and shortly afterwards a torpedo was fired which struck the "*Elysia*" amidships. There was a terrific explosion and in a short time the liner went down by the stern.

The 16,000 ton liner "*Cameronia*" fought a very successful action against enemy aircraft while she was taking part in North African operations. On 21st December 1942, at about 10.30 p.m., while in the

(Continued on page 46)



Avro XIX transport, developed from the "Anson" reconnaissance aircraft. Photo courtesy A. V. Roe and Co. Ltd.

Air News

The Avro XIX

During the war years the Avro "Anson" proved itself one of the safest and most popular aircraft in service with the R.A.F. At the beginning of the war it was used extensively by Coastal Command for convoy duties and general reconnaissance work, and later it became the standard twin-engine trainer for the Empire Air Training Scheme. Then three years ago, when the R.A.F. needed a short-range small transport, they decided that "Faithful Annie" was just the machine for the job. So its fuselage was re-designed to give greater internal capacity, large individual cabin windows were added, instead of the familiar "glasshouse," and the result was the Avro XIX, illustrated above.

Now the XIX has been demobilised and is in big demand for feeder-line air services. Already nearly 200 of these machines have been delivered to operators in Belgium, Egypt, Eire, Ethiopia, and other countries, as well as to many of the charter companies operating in Britain. It has accommodation for six, eight or nine passengers according to the length of stages operated, and also can be supplied as an executive long-range aircraft that, with extra tonnage, can fly 820 miles. Aircraft of this type have been supplied to the Ministry of Civil Aviation. Another model, for photographic work, has been bought by the Eire Air Force, and yet another version is used by the Iraq Air Force, fitted out for photographic reconnaissance, gunnery and bombing. J.W.R.T.

B.O.A.C. Fleet of "Hythe" Flying Boats

The last of the fleet of 21 Short "Hythe" class flying boats has gone into service with British Overseas Airways Corporation, and will join the others on routes to Egypt, India, Hong Kong, and Australia. Already this fleet of British flying boats is operating a total mileage of over 5,000,000 miles a year, and this will be considerably increased soon when the Hong Kong route is extended to Tokyo. The "Hythe" is basically a "Sunderland" III military transport converted into a very comfortable and roomy civil aircraft seating 22 passengers, of whom 16 can be

berthed at night, the remainder having fully-reclining chairs. In addition two tons of freight can be carried. It is fitted with four Bristol "Pegasus" 48 engines and has an ultimate range of more than 2,000 miles at a cruising speed of 175 m.p.h. The "Hythe" is a worthy successor to the famous Short "Empire" flying boats now being retired after nearly 10 years' service.

Convincing proof of B.O.A.C.'s confidence in the future of this type of air transport is the fact that they have ordered three giant 130 ton Saunders-Roe flying boats, each powered by 6 "propjets," geared in pairs. These aircraft will be completed within three years and will be an alternative to the Bristol "Brabazon" I landplane for travellers on the North Atlantic route. J.W.R.T.

A Lockheed "Constellation" transport of American Overseas Airlines recently set up a new commercial transatlantic record by flying from La Guardia Airport, New York, to London in 10 hr. 12 min. The machine carried 1,500 lb. of freight. Only a week previously this machine had made the New York-London flight in the then record time of 12 hr. 7 min.



A fine photograph of the de Havilland "Vampire" single-jet fighter, the type ordered for the Swiss Air Force.

The Swiss Government have taken an unprecedented step in ordering 100 de Havilland "Vampire" single-jet fighters. As their's is almost entirely a fighter air force it means that this British company is now virtually building all Switzerland's military aircraft. The reason given by one news agency for this decision is "because British jet planes are far superior to any other type."

A Goodyear non-rigid airship of the U.S. Navy, carrying a crew of 13, recently set up a new world endurance record without refuelling by remaining in the air 170 hr. 18 min.—a whole week!

Another British Gas Turbine Engine

As a result of their experience with the "Python" gas turbine engine, described in the August 1946 "M.M.," the Armstrong Siddeley company decided that there is a great future for this type of power plant for civil aircraft, especially if a model could be developed in the medium-power range. This research has produced the "Mamba," which weighs only 750 lb., is only 27 in. in diameter and yet has a take-off power equivalent to 1,000 h.p., plus 320 lb. of thrust from its jet.

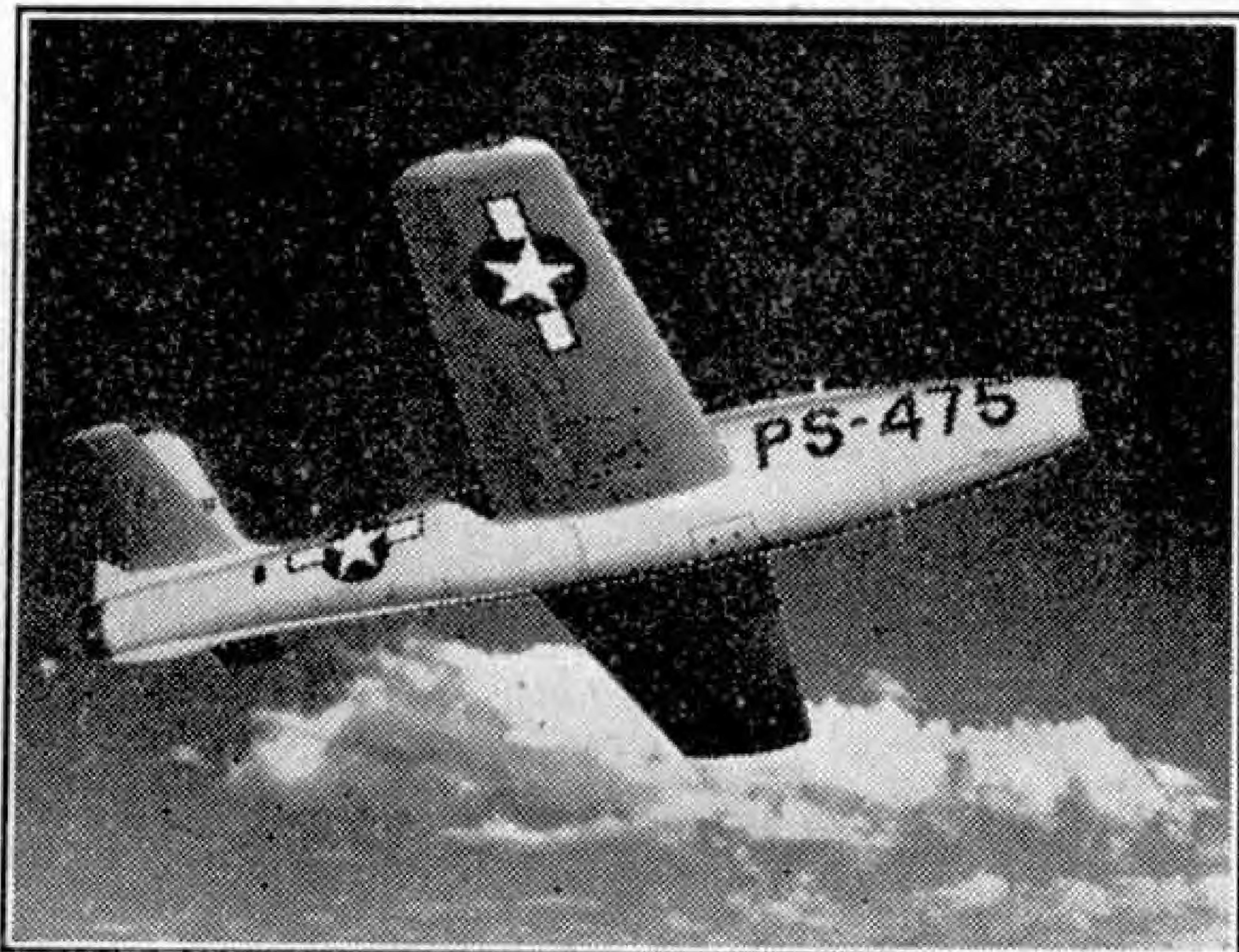
The new engine, complete with jet pipe, is only 9 ft. 3 in. long and is of the axial-flow type. It offers completely new standards of performance, combined with neatness of installation, and the several air liners being designed and built to take "Mambas" include a version of the Miles "Marathon" and the Vickers V.C.2, a four-engined successor to the well-known "Viking."

J.W.R.T.

Percival "Prentice" Trainer

Wartime experience in flight training of aircrew members proved that side-by-side seating of pupil and instructor is better than the usual tandem arrangement. For this reason a number of Percival "Proctors" were used to train observers for the R.A.F. and the Fleet Air Arm. At the same time a "spare" pupil was usually carried in the third seat, behind the other two, the idea being to give him extra flying time and enable him to listen to the words of wisdom imparted to the trainee by the instructor. The idea proved so good that the Air Ministry issued a Specification T23/43 in 1943 to provide a new training aircraft specially designed to carry the instructor and two pupils in this manner, and also to give the latter rather more advanced training than had been possible in the older primary trainers.

Percival Aircraft have designed a new trainer to this specification, and it is shown in the lower photograph on this page. This machine, named "Prentice," has been developed from the "Proctor" but is of all-metal construction. It is a neat low wing monoplane with a fixed, spatted undercarriage, and is fitted with either a 250 h.p. D.H. "Gipsy Queen" 32 engine or a supercharged 296 h.p. "Gipsy



Republic XP-84 "Thunderjet" fighter. One of these machines, flying over a 3 km. course at Muroc Lake, California, averaged a speed of 611 m.p.h., and on a test flight attained 619 m.p.h. Photograph by courtesy of Republic Aviation Corp., U.S.A.

Queen" 51. Dual controls are fitted for the instructor and first pupil, and a set of the new synthetic night-training screens is provided, which enables pupils to be trained under night-flying conditions in broad daylight. Safety devices include "crash-proof" fuel tanks, a jettisonable cockpit cover, and a steel crash arch behind the front seat. The "Prentice" has a wing span of 46 ft., is 31 ft. 3 in. long, and has a top speed of 171 m.p.h.

J.W.R.T.

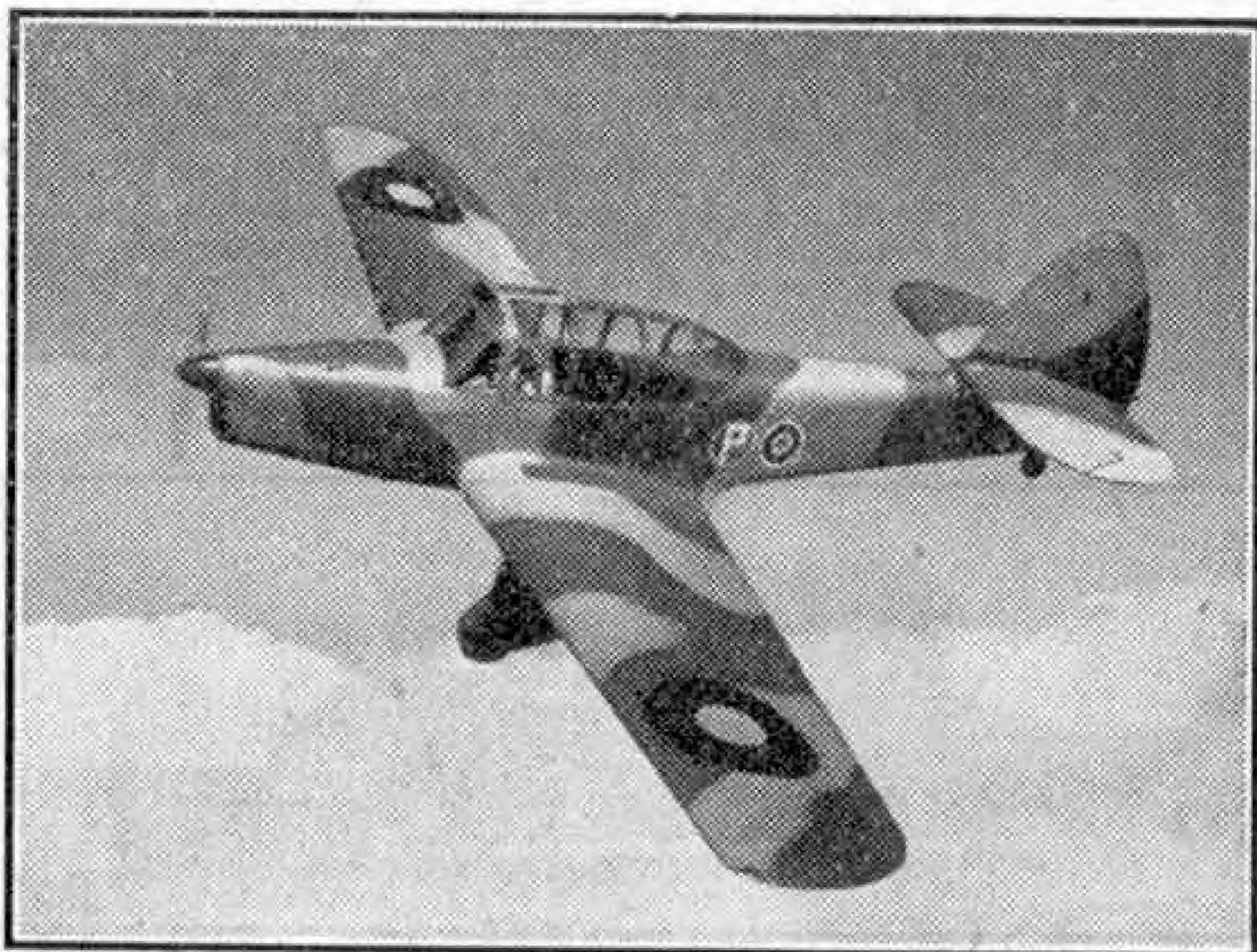
World's First Jet Air Liner

The "Nene"-engined "Lancastrian" which on 18th November last was flown from London Airport to Le Bourget, France, in 50 min., averaging 263 m.p.h., is the world's first jet-propelled air liner. It was modified from a standard "Lancastrian" by Rolls-Royce Ltd., as part of their engine development programme. The only apparent external modification is the replacement of the two outboard "Merlin" engines by two of the new 5,000 lb. thrust "Nene" jet units, but internally it is fitted out as a "flying laboratory," with dozens of extra instruments to indicate the slightest variations in the behaviour of each engine. A camera is installed to photograph the main instruments during flight, so obviating the need of tedious tabulation of readings by the aircrew.

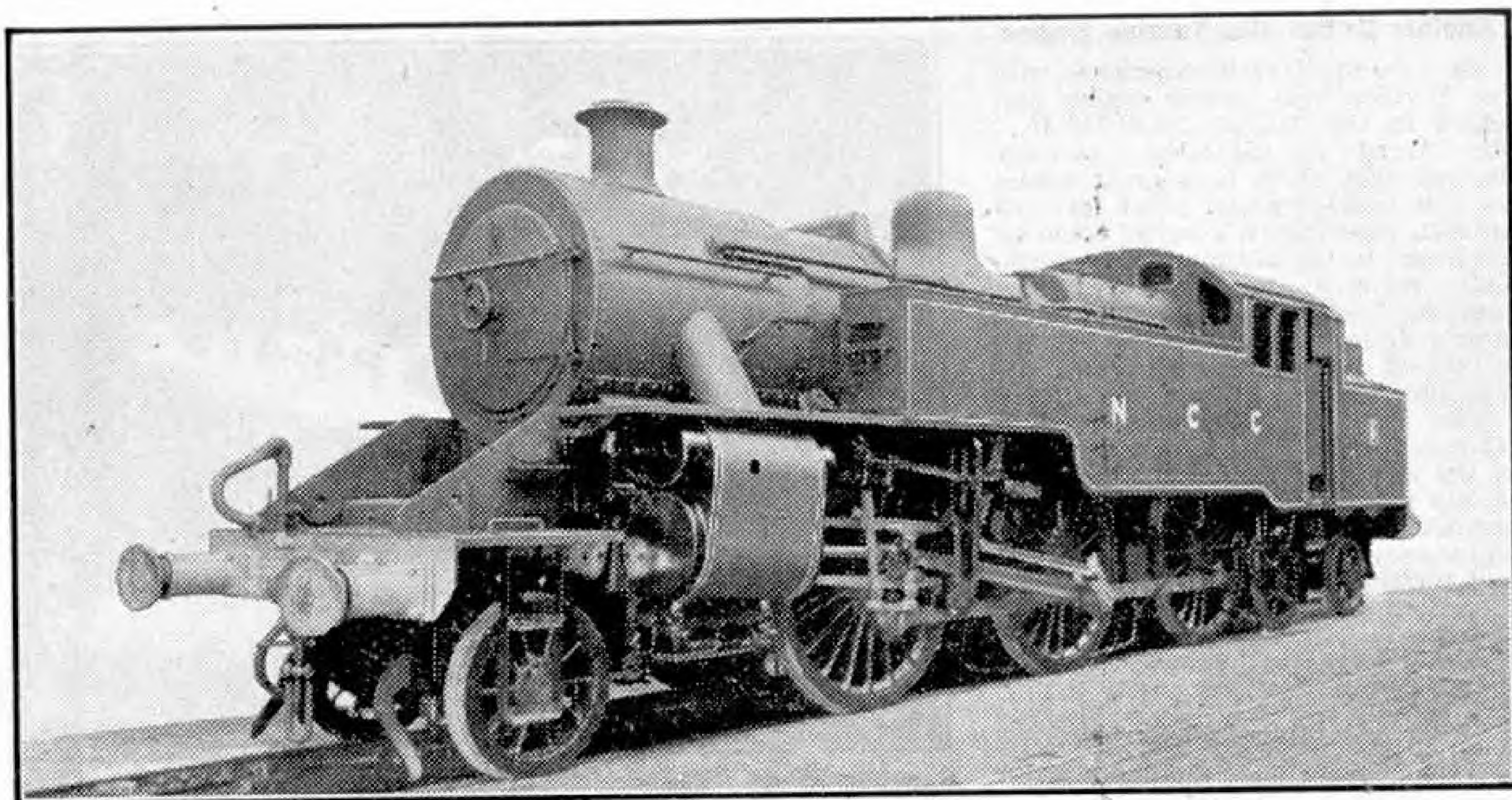
Altogether 2,385 gall. of paraffin are provided for the "Nene" engines and 740 gall. of petrol for the "Merlins," giving the jet "Lancastrian" a range of nearly 800 miles. Operating on the "Nenes" alone, it will cruise more than 100 m.p.h. faster than a standard "Lancastrian," and can maintain height easily on just one "Nene." With the "Merlins" switched off there is hardly any noise or vibration in the cabin, the only indication that the machine is moving being the rush of air past the fuselage.

It is likely to be some time before jet-propulsion for air liners becomes a practical proposition, but Air Commodore Whittle stated after a recent visit to America that Rolls-Royce were doing more in the field of jet-propulsion than all the American firms put together, an encouraging fact from the creator of the modern jet engine.

J.W.R.T.



Percival "Prentice" 3-seat trainer aircraft.



New L.M.S. (N.C.C.) Tank Engines

THE Northern Counties Committee section of the L.M.S., or "N.C.C." as it is familiarly known, forms an outpost in Northern Ireland of the parent system. It links Larne with Belfast and serves Coleraine, Portrush, Londonderry and other points. A new design of 2-6-0 tender locomotive was built at Derby in 1933 for use on this line. It was based on the L.M.S. standard parallel-boiler 2-6-4 tank designed by Sir Henry Fowler. Fifteen of these engines have since been built and have proved very successful on mixed traffic duties.

Recently a 2-6-4 tank version of these engines was completed for the N.C.C. at Derby works to the designs of Mr. H. G. Ivatt, Chief Mechanical Engineer. The cylinders, connecting rods, valve gear and general chassis design, as well as the parallel-barrel boiler, follow broadly the design of the original L.M.S. 2-6-4 tanks, and are standard with those of the existing N.C.C. 2-6-0s. Various new features have been included such as a self-cleaning smoke-box, rocking grate, self-emptying ashpan and side-window cab. The bunker has the upper part of the coal space inset to permit free vision for the crew when the engine is running backward, and outside steam pipes are fitted to the cylinders.

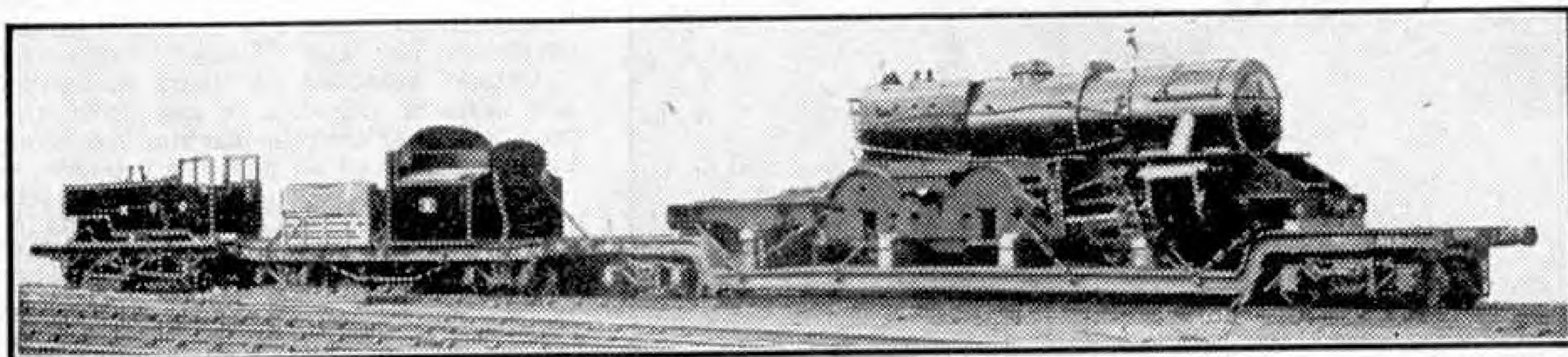
Features peculiar to the N.C.C. which differ from L.M.S. standard practice include the use of top feed apparatus on a parallel boiler, a circular handwheel on the smoke-box door, Dreadnought type vacuum ejector, Detroit sight-feed cylinder lubricator, and a cast number plate.

The transport of such large engines from Derby to Belfast presented a number of problems. After final assembly the engines were partly dismantled, and the three largest units, consisting respectively of frames complete with boiler, side tanks and bunker, were loaded on three special wagons for the journey to Heysham, the remainder of the components including the wheels being conveyed in seven ordinary wagons.

The main consignment, which consisted of the engine frames complete with boiler weighing 36 tons, provided a difficult job owing to the overall length being 43 ft. 3 in. This could only be carried on a special type of vehicle of which the L.M.S. possess only six. A further point was that the sheer legs at Heysham are only 32 ft. apart at the base, but experiments with models proved that the load could be slewed sufficiently to pass through for loading on to the L.M.S. cargo steamer "*Slieve Bloom*."

The off-loading at Belfast was simplified by the use of a 150-ton floating crane hired from Harland and Wolff Ltd.; this firm also lent the lifting equipment used at Heysham and Belfast. On landing, each of the main consignments was placed on the leading and trailing wheels and hauled to the works of the N.C.C., where each locomotive was completely reassembled.

The first engine arrived at Belfast in August last, the remainder following at fortnightly intervals. They are numbered 5, 6, 7 and 8. Unlike previous N.C.C. engines which had all been painted "Derby red," these new tanks are finished in black with straw-coloured lining and maroon edging.

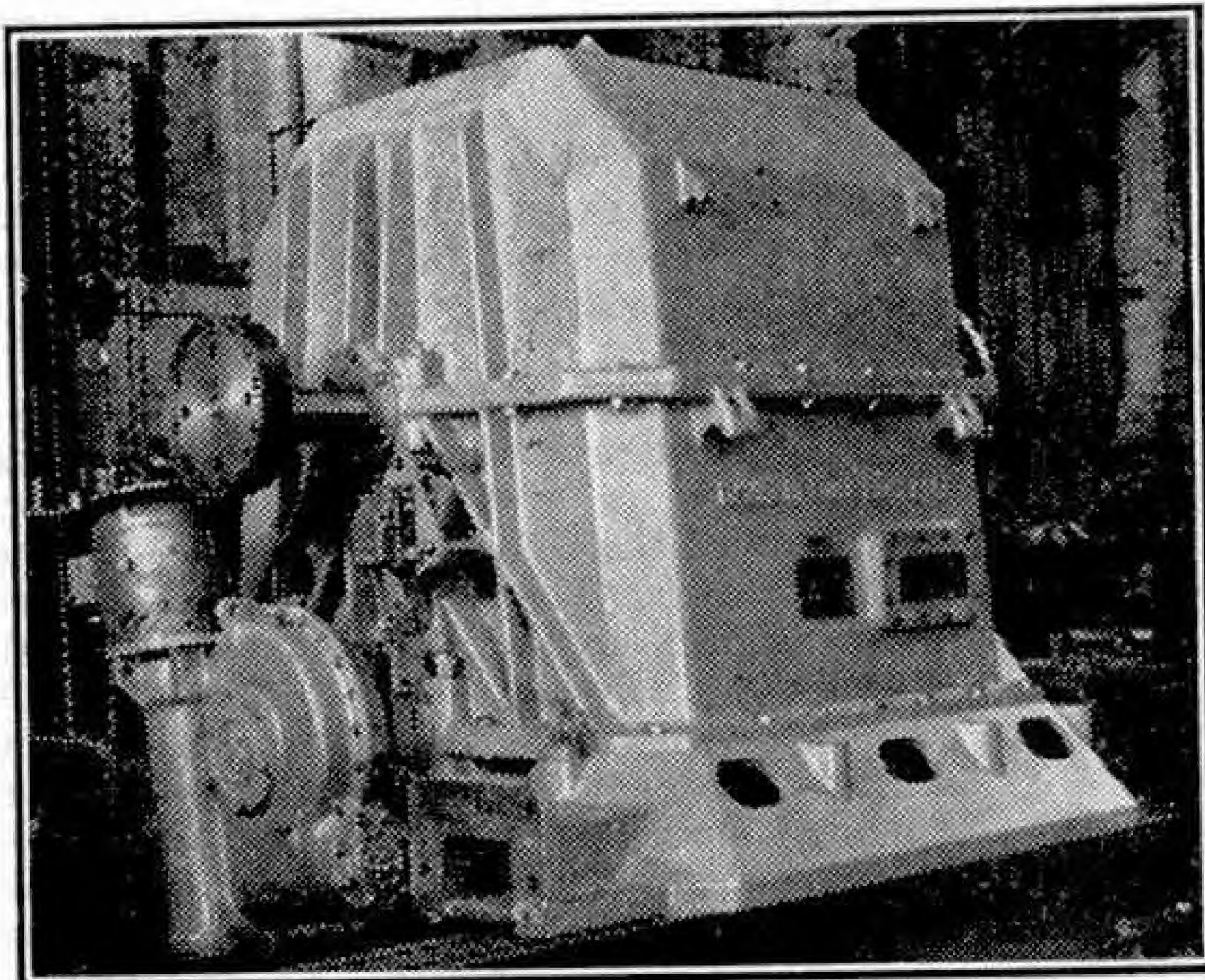


The upper illustration shows No. 5, the first of the new L.M.S. (N.C.C.) 2-6-4 tank engines. The lower view shows how the component sections were arranged for shipment. Photographs by courtesy of the L.M.S.R.

Engineering Notes

A Large Gear Unit for South Africa

The illustration on this page shows a special double-reduction helical gear unit recently manufactured by David Brown and Sons (Huddersfield) Ltd., for use in connection with the drive arrangements of a heavy tube mill for cement grinding in South Africa. It gives a speed reduction from 735 to 23 r.p.m., and is designed



The double-reduction helical gear unit that is referred to on this page. Photograph by courtesy of David Brown and Sons (Huddersfield) Ltd.

to transmit 450 h.p.

A separate double-reduction worm gear unit is used to rotate the mill when inspection, charging or re-lining is necessary, and this operates through the layshaft of the main gears. It is driven by a 9 h.p. motor running at 2,850 r.p.m., giving a mill speed of 0.25 r.p.m., and to make the operation of the auxiliary barring gear foolproof, a gear type clutch is fitted between it and the main drive. Electrical limit switches mounted in conjunction with and operated by the control handle are designed to prevent the starting of the auxiliary motor unless the clutch is engaged, and to prevent the use of the main motor until this clutch is disengaged.

In order to eliminate the possibility of wear in the mill bearings causing distortion and misalignment of the gears, a special coupling is interposed between the output shaft of the gear reduction unit and the input shaft to the mill.

British-built Ships for Argentina

Three first-class passenger and cargo ships have been ordered by the Argentine Government from Vickers-Armstrongs Ltd. The ships will be of 18,000 tons displacement, and are intended for service between the River Plate and the Atlantic ports of America and Europe. They will be driven by geared turbines and will have a sea speed of 18 knots. The ships will be built at Barrow, and will provide work for a total of about 6,000 men.

"Normandie" Sold for Scrap

When the French liner "*Normandie*," once valued at about £15,000,000, was recently put up for auction as scrap, the highest bid received for the entire hull and machinery was £40,420. The ship was destroyed by fire while in dock in the United States in February 1942, causing her to heel over on one side. She was eventually raised to an even keel, but has since remained derelict.

A New Method of "Casting" Metals

A new system of "casting" metals is being tested experimentally in Russia. The method is quite different from the familiar one in which molten metal is poured into moulds of the required pattern, and it consists of immersing the mould itself in the metal. The mould is designed so that cold water can be circulated through it and is allowed to remain in the molten metal until an even layer of the required thickness has been crystallised on its surfaces. "Castings" produced in this way are smooth surfaced and are said to be free of flaws and other blemishes.

A Great American Highway

The great Pan-American Highway in the United States has now been completed to a length of 1,498 miles. The road is paved from Laredo, Texas, to Mexico City, a distance of 762 miles, and a further 344 miles to Oaxaca is hard surfaced. When finally completed the highway will extend from Laredo to the Panama Canal, a total distance of 3,250 miles.

Of General Interest

A Strange Magnet

Can you think of any use for a compass that would point east and west instead of north and south? This kind of compass could be made of a new magnetic alloy that can be magnetised sideways rather than lengthways. The name of this alloy is Silmanal. There is no real advantage in making magnets that point east or west, and the chief value of the new alloy is that it is capable of withstanding severe de-magnetising effects. This makes it useful in the manufacture of electric relays and instruments that are to be used in strong electric fields.

Silmanal is the product of the General Electric Co. of New York, which has introduced other magnetic alloys of novelty and interest. Two of these, to which the names Cunife and Cunico have been given, can easily be machined and therefore can

readily be given a variety of sizes and shapes. Cunife is so ductile that it can be drawn out in the form of a very fine wire, and both alloys have really good magnetic properties. Another new magnetic alloy is Vectolite, which is very light in weight, and provides us with the lightest magnets of any given size that have yet been developed. Perhaps the strangest thing about Vectolite, however, is that it is built up of oxides, so that it forms non-metallic magnets, the only ones in use to-day. It is a hardened combination of iron and cobalt oxides mixed in the desired proportion when still in the powder form and sintered. The iron oxide in Vectolite is not rust, but one provided by iron ore deposits.

Alloy Measures its Own Temperature

An alloy that shows how hot it is by its temperature is another product of the engineers of the General Electric Company of New York. They wanted to know the temperatures inside a gas turbine and found that the most elaborate temperature measuring devices failed to tell them exactly how hot the spinning rotor of a turbine becomes. Their problem was solved when they discovered the new alloy, which shows a marked colour change for every increase of 25 deg. C. between 500 and 700 deg., then reverts to its original tint and runs over the colour scale again as its temperature mounts higher. All that they had to do then was to use the alloy in making the turbine wheel and this obligingly revealed its own temperature.

Five Languages on One Signpost

The illustration on this page shows a unique signpost erected a short time ago on the main Birkenhead-Chester Road, about 100 yards south of the bridge over Bromborough Pool. It gives directions in five languages, English, Russian, Arabic, Malay and Chinese, and has been placed there for the benefit of foreign seamen from vessels berthed at Bromborough Dock. I have seen a signpost in English and Welsh, and in Eire most direction signs are in Gaelic and English, but this Bromborough example is surely the most multilingual of all. It would be interesting to know if there are any signposts of this kind elsewhere.

C. R. ROWSON.



A signpost in five languages. It is to be seen on the main road from Birkenhead to Chester. Photograph by C. R. Rowson.



An outsize load by rail. A 130-ton stator that travelled by rail from Heaton, on Tyneside, to Birmingham. Photograph by courtesy of C. A. Parsons and Co. Ltd.

An Outsize Railway Load

The illustration at the head of this page shows one of the most awkward loads ever carried by British railways. This is a giant electrical alternator stator, weighing 130 tons, part of new electrical equipment built by C. A. Parsons and Co. Ltd., Heaton, Tyneside, for the Hams Hall "B" Power Station, Birmingham. Because of its great weight and its width of 13 ft. 1½ in., the stator had to have a special train all to itself, and this could be run only on Sundays, when the adjoining line could remain unoccupied and signal posts and other obstacles could be temporarily removed if necessary to allow its passage. The full journey of 268 miles occupied portions of six successive Sundays.

For its journey the stator was mounted on two girders and suspended between two wagons. The purpose of this was to keep it as low as possible so that its top would not foul bridges and tunnels. Its great width made it necessary to arrange for it to be moved sideways where necessary to pass fixed structures. To relieve the weight on the two wagons, each designed to support 70 tons, cantilevers were employed, attached to the main girders. These were mounted on 60-ton flat wagons, and the balance weights at their remote ends swung in the frames of 20-ton trolley wagons. Eight men accompanied the load throughout its trip,

and were housed in a special van while the load was travelling.

Giants on the Road

In general out-of-gauge loads can be moved most easily by road, but even then it occasionally happens that the roadway under a bridge has to be lowered or some other special measure taken to allow the passage of anything of an unusual size. The lower illustration on this page shows how road transport is adapted to the movement of machinery of unusual size. In this case the load is a huge 45,000 kVA 132/33 kV transformer built at the Stafford Works of the English Electric



A 45,000 kVA 132/33 kV transformer for the Central Electricity Board, leaving Stafford by road for Nottingham. Photograph by courtesy of the English Electric Company Ltd.

Co. Ltd. for the Central Electricity Board. It is shown on a giant special multi-wheeled vehicle designed for loads of this description leaving the Stafford Works for Nottingham. The complete transformer weighs 125 tons, but its weight as shown on the road was 92 tons.

The rear wheels of the special transport vehicle used can be steered as well as those at the front. Two tractors were used for hauling the load, and on a steep hill near Stafford one of the tractors was coupled at the rear.

Deep Channels

With a Dredger in the Tropics

By Alan Kendall

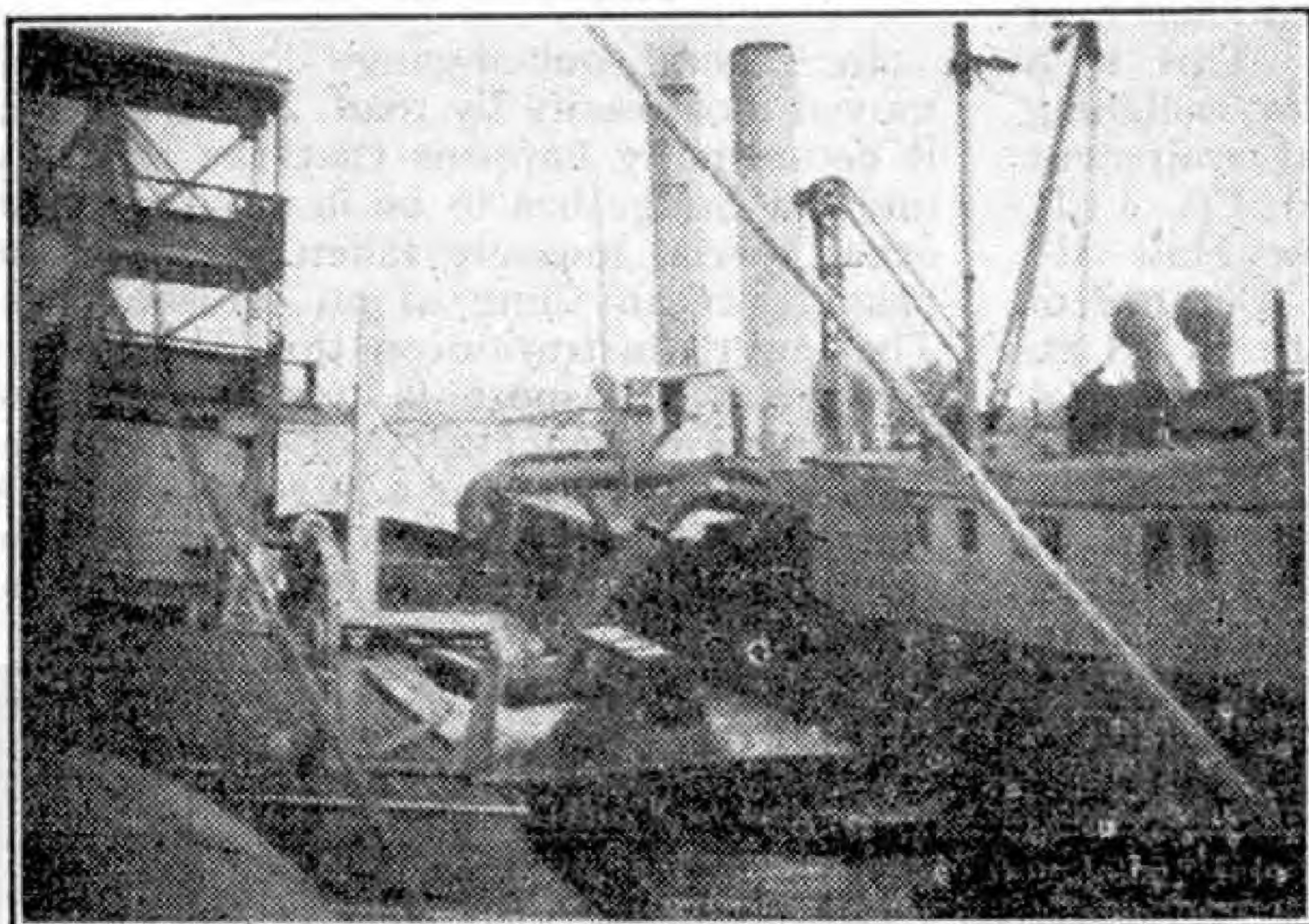
LAGOS is now the main outlet for the vast colony of Nigeria, which is over three times the size of the British Isles, and handles an ever-increasing volume of traffic. Its deep water berths for sea-going ships were constructed in 1914, and will take ships up to 20,000 tons, but the passage from the docks to the sea is a long and tortuous channel down a sandy

funnel, etc. forward, and her engines right aft. This unusual arrangement is to ensure that the ship remains on an even keel throughout the whole of the dredging operations. At first sight the engine room appeared to be a complete maze of pulsating machinery, with pipes, wheels, levers, dials and dynamos covering every inch of space. The temperature down here was super-tropical, and within a couple of minutes I was bathed in perspiration, my throat was filled with the reek of hot oil, and my ears were deafened with the throbbing of pistons.

When I had become accustomed to the conditions the Second Engineer showed me round. The ship is propelled by twin screws, and each of these is driven by a 1,000 h.p. engine. As I watched, a bell rang above us, and a pointer on a large dial swung round to "Slow Ahead." The Chief moved a lever over, and as the massive pistons began to rise and fall I knew that the day's work had begun.

After crawling along a catwalk and watching the propeller shafts steadily spinning beneath me, I was shown the main pumping engine, which does the actual dredging. A clever arrangement of valves makes it possible for this engine to suck or pump, according to whether the dredger is loading or discharging. When sucking it creates a vacuum in the pipe of 23 inches.

The steam for these engines is used on the triple-expansion principle, and is then passed into a condenser. An auxiliary engine pumps up cold sea water and circulates it through thin pipes passing through the condenser. This cools the steam until it condenses to water again, and is drawn off to the main boilers for re-use. A fourth big engine provides the hydraulic power by which the suction frame is raised and lowered, and operates

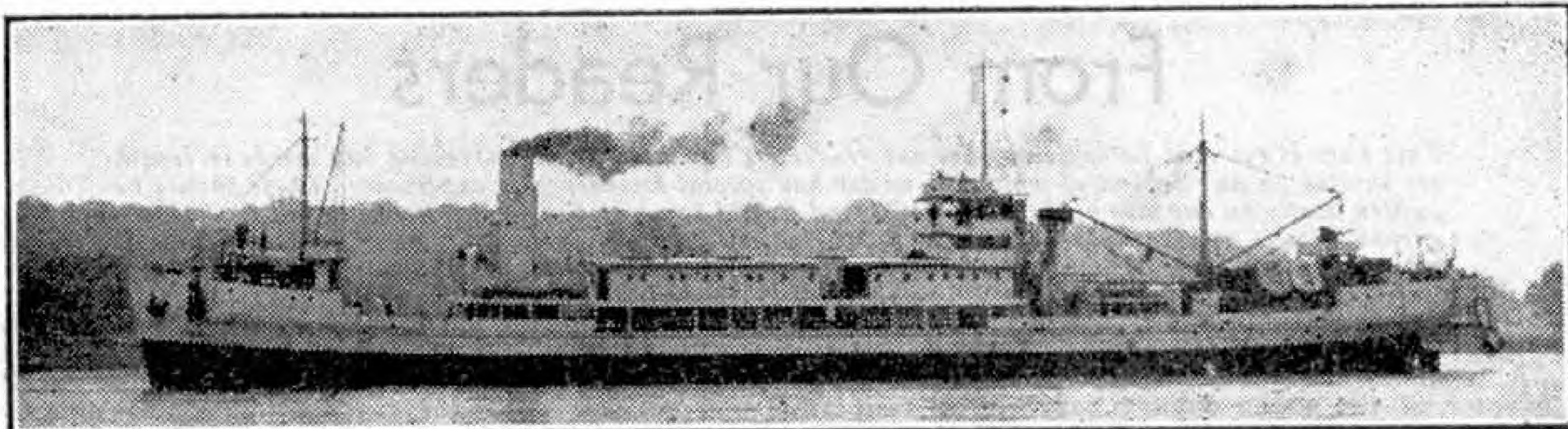


Pumping spoil from the hopper of the dredger "Lady Bourdillon" into a barge, from which it is pumped by the "Lady Thompson," on the right, to the site of a land reclamation scheme.

creek, which has to be dredged daily to maintain the necessary depth. During my stay in Lagos I had often noticed a strange-looking ship moving very slowly up and down the channel. I knew that she was a dredger, but that was as far as my knowledge went when one morning I climbed up the ladder to the deck to find out how, when and where it dredged.

On reaching the deck, I was received by the Chief Engineer, who told me that the dredger was a ship of 4,000 tons hopper capacity, and was named "*Lady Bourdillon*," after the wife of the former Governor of Nigeria. The ship is a hopper suction dredger and is one of the largest of her type in the world. She was built by Wm. Simons and Co. Ltd., Renfrew, in 1943, and arrived in Lagos in December 1944.

The "*Lady Bourdillon*" has her boilers,



The dredger "Lady Bourdillon," which is engaged in keeping open the passage between Lagos, Nigeria, and the open sea. Photograph by courtesy of Wm. Simons and Co. Ltd., Renfrew.

the valves. It produces a pressure of 1,000 lb. per sq. in.

On returning to the bridge, I found that we were by now out in midstream, and dredging was about to begin. In the control room I was introduced to the Second Mate, who was watching over an array of dials and telegraphs and looking through the windows that gave an uninterrupted view of the stern of the ship. From here I could see the main suction pipe, connected to the ship by a large ball and socket joint. The mate rang an engine room telegraph, and the scoop suction frame and nozzle were lowered to the sea bed. The maximum dredging depth is 45 ft., but the Captain told me that their job in Lagos is to maintain a deep channel at an average depth of 27 to 30 ft. The nozzle is dragged along the sea bed, and the spoil is sucked up into the ship's hopper. This hopper occupies all the midship space between the boiler room and the engine room, and has a capacity of 4,000 tons. It is divided into four compartments, and the spoil is evenly distributed between them. A stone box, fitted with a large grid, prevents any rocks or solid matter from blocking the pumps. The sand sucked up sinks to the bottom of the hopper, and the water flows back over the side.

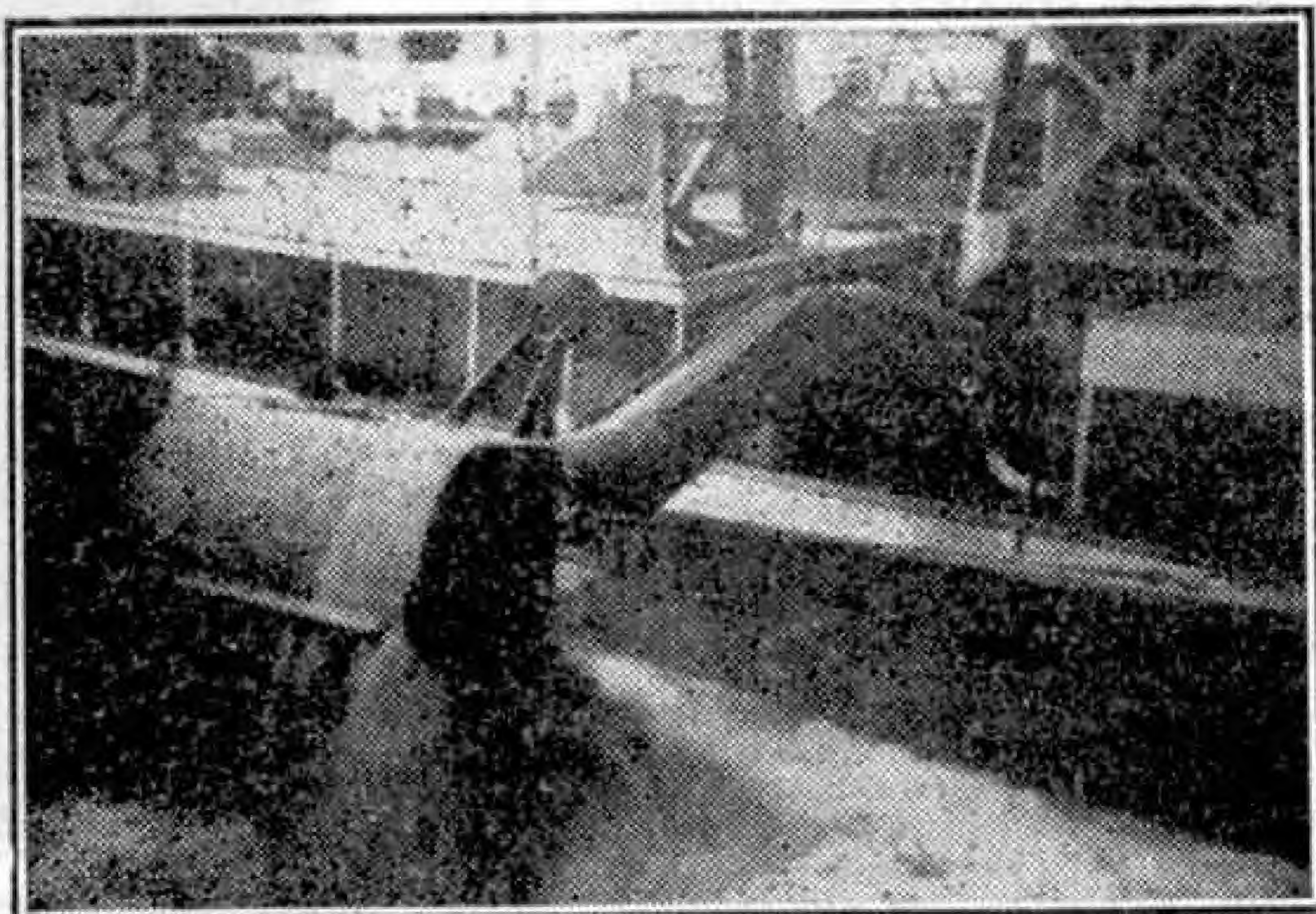
Back on the bridge, the Captain explained to me the great difficulty of keeping the ship on a straight course while dredging. The dredge has the effect of an anchor, and the strong tides are continually swinging the bows to port or starboard. The ship has a draught of 20 ft., and there is so little room to manœuvre that a strong tide would have her aground in no time if the Captain's vigilance were relaxed. The periodical vibrations,

he told me, were due to the nozzle encountering thick mud or clay.

When dredging in the dock area, a careful watch must be kept on the anchor chains of shipping. The power of the suction pump can be judged from the fact that on several occasions heavy ship's anchors have been sucked up, although the dredger was some distance from the ships concerned. Anchors cannot pass up the pipe, of course, but might cause an awkward blockage that would take many hours to remove.

The course of each dredge is accurately plotted on large scale charts. In addition to the suction pipe, the ship is also fitted with a cutting apparatus, which can be lowered to the bottom to cut away any rock or solid substance which the suction nozzle cannot move.

In a little over an hour's steaming the hopper indicators showed that it was full, and the suction frame was hoisted up. On an entirely sandy bottom the 4,000 ton hopper can be filled in 65 min. The spoil is disposed of in two ways. It can be used for a land (Continued on page 46)



The overside-discharging hood of the "Lady Bourdillon," which is mounted on a ball and socket joint, discharging spoil into a barge.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

A NEW WATT MEMORIAL

A memorial to James Watt, the Greenock-born inventor of the steam engine, has been erected at Kinneil Estate, Bo'ness, West Lothian, Scotland, and was unveiled there on 3rd August of this year by Mr. H. E. White, Chairman of the Carron Company, Falkirk. The memorial takes the unique form of a three-ton cast iron cylinder, which was made to Watt's orders by the Carron Company and erected by Watt at Bo'ness as part of the world's first condensing steam engine. The engine was designed by the inventor for the purpose of pumping water from coal mines at Bo'ness.

The massive cylinder, which has been preserved by the Bo'ness Gas Company for over 100 years, was transferred to a site alongside the outhouse at Kinneil House, where Watt, under the patronage of Dr. John Roebuck, an eminent scientist and mineralogist, who was the leading figure in the formation of the Carron Company, conducted the experiments which resulted in the completion of his first steam engine and the dawn of a new industrial era. The cylinder had been offered by the Gas Company to the Watt Club in Edinburgh, which was unable to accept it for erection in Edinburgh, but induced the Carron Company to interest themselves in making a permanent memorial of the historic relic. The Carron Company is the oldest ironworks in Scotland, having been founded on the north bank of the River Carron in 1759. The company was incorporated by Royal Charter in 1773 and alone holds the warrant of "Iron-founders to the King."

The Bo'ness Town Council gifted the site, and arranged with the Carron Company for the future preservation of the cylinder. The Town Council also carried through repairs to the ruined outhouse, in which Watt had lived and laboured.

P. W. DUNDAS (Bo'ness).

A WARTIME JOB

During the war my mate fitter H. Horstman and myself, with two native labourers, were given the task of dismantling a water softener at Potfontein on the main Kimberley line, for removal to Putzunderwater on the South-West Africa branch. Our first day was spent in dismantling the

pumps inside the pump house. Then we had to tackle the tank itself and the machinery on top of it. This proved a very difficult task, for we could not use any rigging, and to make things more difficult a strong wind was blowing. Some of the bolts holding

the platform parts could not be reached, so we had to take the risk and make use of the "lift" which we used to transport tools and small parts up and down the tank. This lift consisted of an oil drum cut in half, secured to a long rope slung over a projecting pipe at the top of the tank. To go up in this proved no easy task because the motive power was supplied by two of us, while one went up in it, the other watching for flaws in the rope. Although the wind did its best to dislodge the lift, we succeeded in dismantling the parts and lowering them to earth.

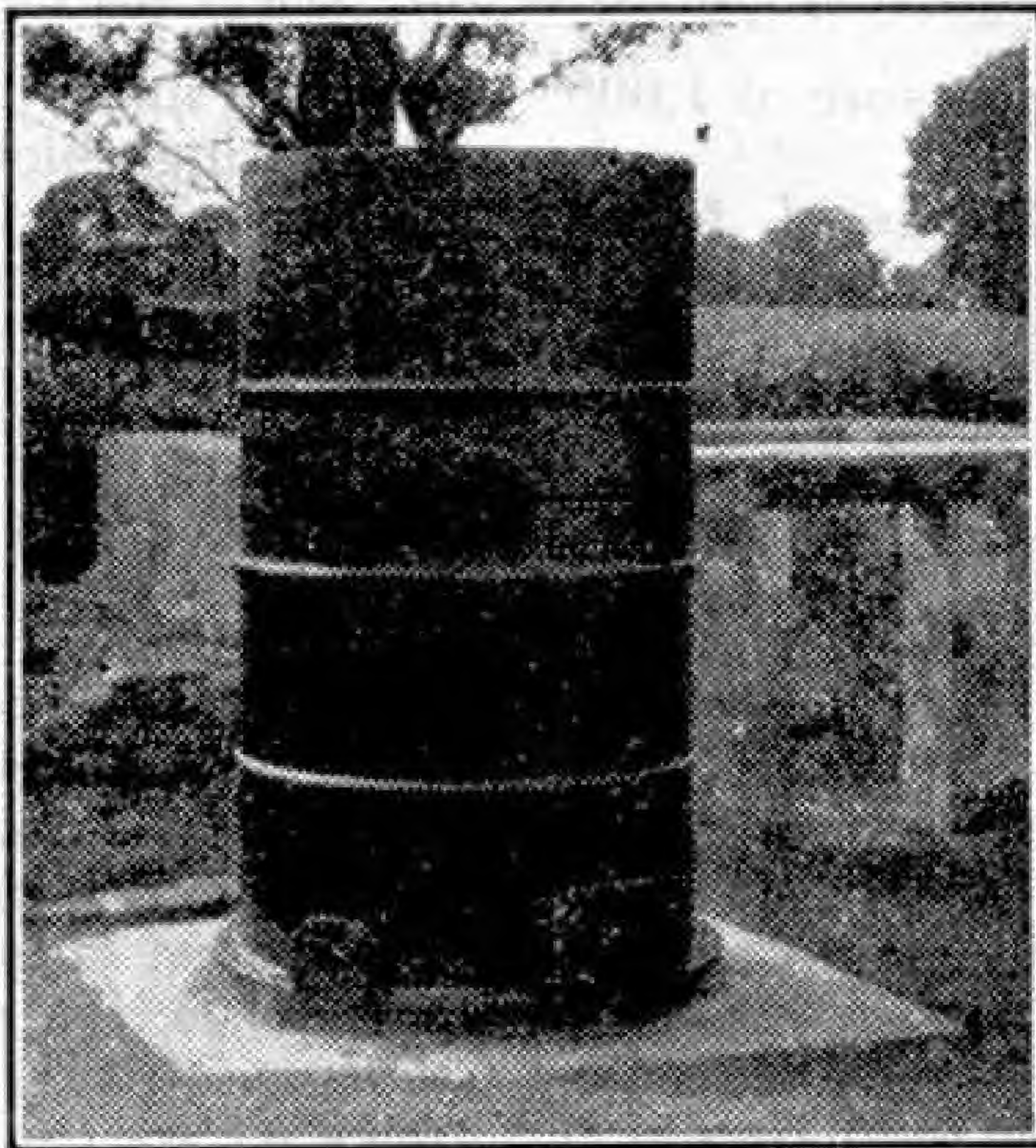
A few days later we again left for Potfontein, but this time we were accompanied by more men as well as the huge breakdown crane. After the 40-ft. tank had been tipped on to its side by the crane, the welder set

about burning the heads of the rivets, which were then removed by means of punches and 14 lb. hammers. I can assure you that to knock out 700 rivets in a cramped space was no joke. The tank was turned each time more rivets had to be burned off, by means of a rope wound round it and hooked to the jib of the crane. That night, using the powerful arc-lamps of the breakdown crane, we loaded the two halves and all other parts into the trucks, the two halves going on two well-wagons.

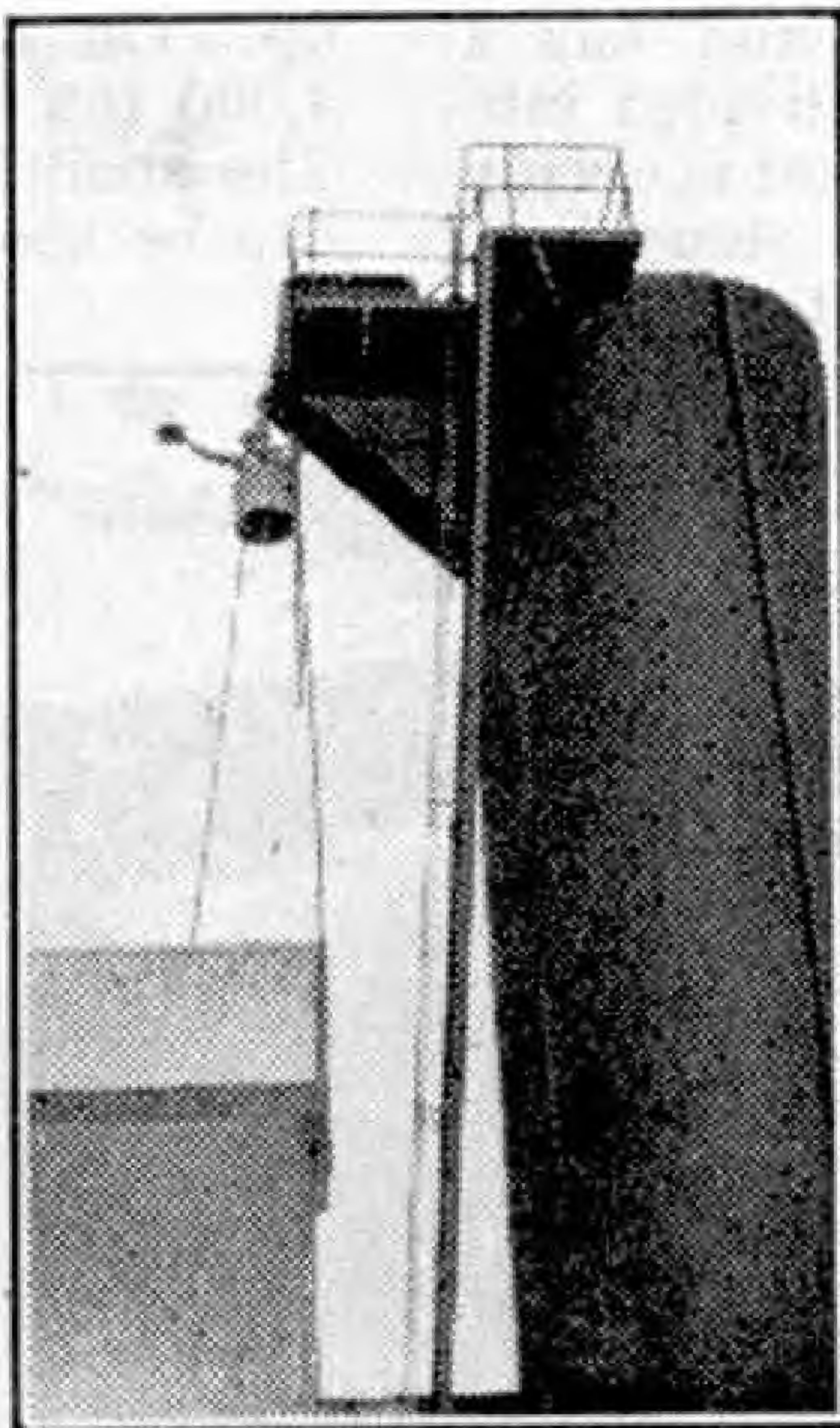
The following morning we left for De Aar, some 30 miles away, with this strange procession. We were not even sure if the halves would clear some of the platforms, and we were especially anxious about the Brak river bridge. The train travelled at about 20 m.p.h., and on nearing the bridge our nerves were quite frayed because the Capetown mail train was only half an hour behind us. At walking pace the train went over the bridge, and to our delight it cleared.

It was with glad hearts that we clocked out that afternoon, but we were quite proud of the fact that we had done a good job, which would help the war effort of the S.A.R.

S. JAKOBSEN
(De Aar, South Africa)



A memorial to James Watt, unveiled at Kinneil Estate, Bo'ness.



Dismantling a water softener on the South African Railways. Photograph by S. Jakobsen, De Aar.

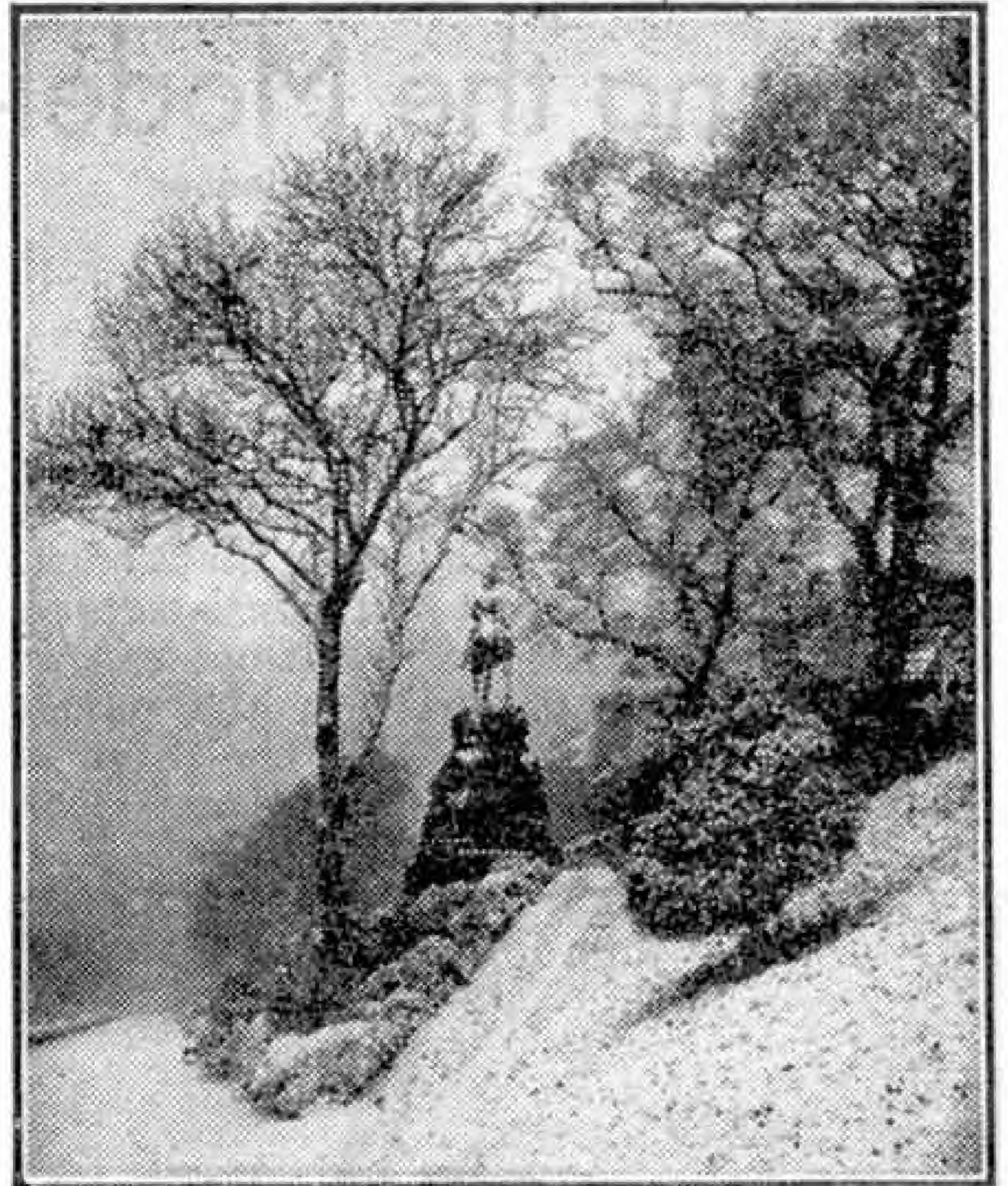
Photography

Snow and Frost

IT is difficult in this extraordinary climate of ours to know what to expect in the way of weather, but we may reasonably look forward to a certain amount of snow during this month. Really heavy down-falls, which last for a considerable time, are comparatively rare, however, and usually it is necessary to be on the spot with the camera quickly.

The ideal combination is snow and sunshine, and the best pictures are taken in the morning. A big expanse of snow glistening in morning sunshine looks very attractive, but it makes a poor picture unless the white surface is broken in the foreground by dark patches produced by walls, fences, trees or shrubs. The banks of a small stream or of a pond often provide really good opportunities.

One or two figures in the foreground often give a specially attractive touch to



Scots Greys monument in Princes Street, Edinburgh.
Photograph by W. Reid, Edinburgh.



Sunshine and Snow. Photograph by S. S. Pethybridge, Newton Abbot.

the picture. Slow-motion scenes such as children rolling a big snow-ball or constructing a snowman are always worth a film or two. Winter sports such as skating, sledging or curling make good pictures provided that they can be taken in bright sunshine. Scenes of this kind taken in dull light are apt to look very dreary. This dreary effect can sometimes be used to advantage in hill or moorland scenes, but as a general rule absence of sunshine means absence of life in the picture.

Frost, apart from snow, is capable of doing wonderful things

with trees and shrubs, and the delicate tracteries often to be seen make attractive pictures. Quite often really good bits of frost design are to be found in even a small garden.

Town dwellers should look out for unusual pictures produced by snow covering or partly covering the familiar scenes. Often a really ugly building or street looks attractive in its winter coat.

Any kind of camera is suitable for this work; in fact a simple type is often better because it is easier to handle with cold and awkward fingers.

Negatives of snow or frost scenes print best on gaslight or bromide papers, which give the required black-and-white effect.



Among the Peeblesshire hills. Photograph by W. Reid, Edinburgh.

Among the Model-Builders

By "Spanner"

An Unusual Compound Gear

In some models such as joy wheels, a simple mechanism is required that will produce constant rotary motion, and also eccentric motion. A mechanism suggested for this purpose by P. Thomson, Blackburn, is illustrated in Fig. 1. It consists of a 2" Rod fixed in the boss of a Double Arm Crank bolted to the base of the model in which it is incorporated. The drive is transmitted through a 2½" diam. Gear

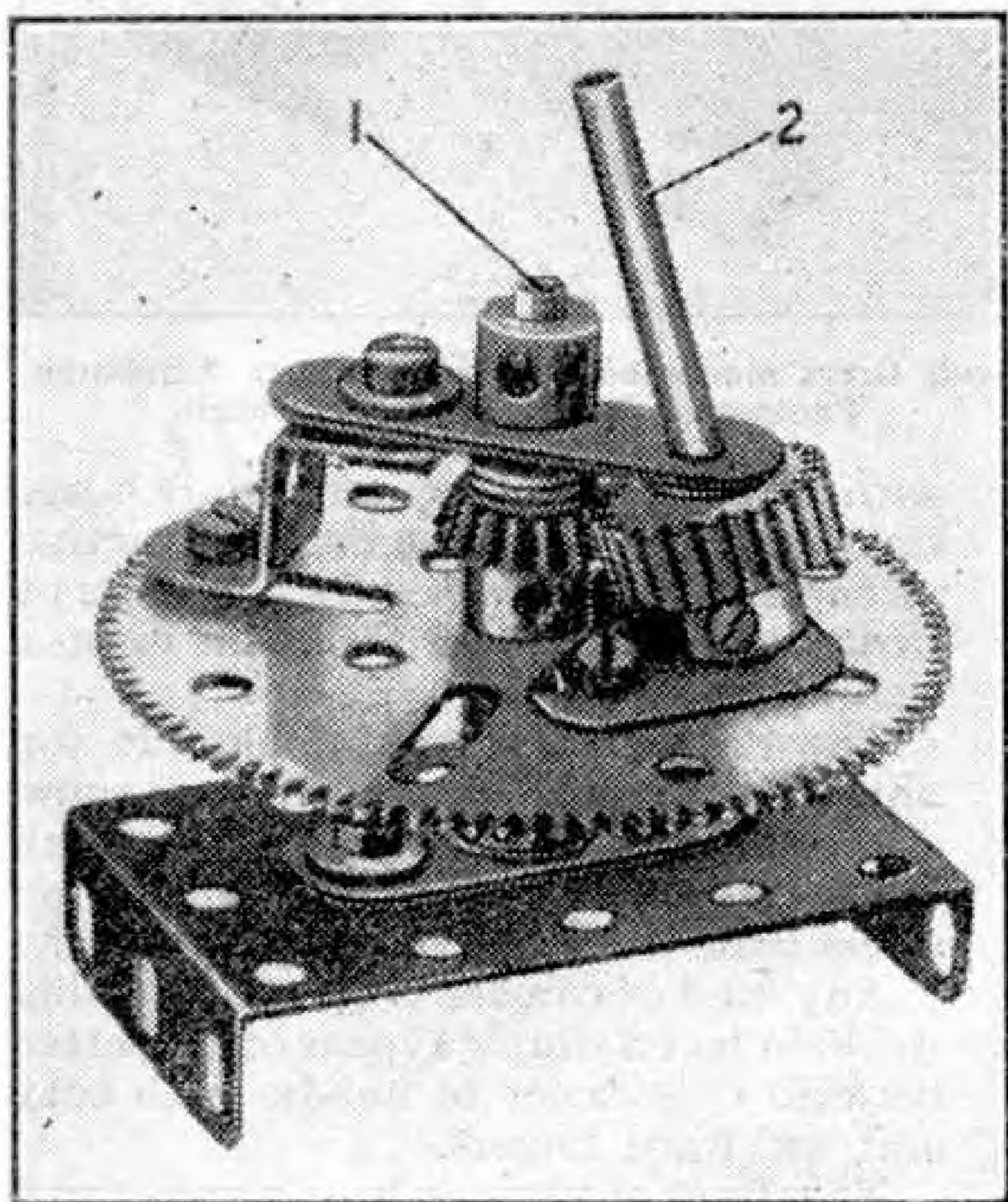


Fig. 1. An unusual compound Gear.

that is mounted loosely on this Rod to a Rod 2. Rod 2 is held in a 1" Corner Bracket bolted to the face of the Gear, and a ¾" Pinion secured to it is meshed with a ½" Bevel Gear fixed on the Rod 1. A second support for Rod 2 is provided by a Double Arm Crank that is mounted loosely on Rod 1 and fixed to the 2½" Gear by a ½" Reversed Angle Bracket. As the 2½" diam. Gear rotates, the ¾" Pinion is caused to run around the ½" Bevel Gear on Rod 1, and also to rotate at a reduction ratio of 25:16 in relation to the driving gear.

A Neat Crankshaft

I have been asked several times recently for suggestions regarding the making of

small crankshafts suitable for incorporation in miniature engines, and I think the example shown in Fig. 2 is one that is likely to meet most requirements.

This example illustrates a novel method of building up small crankshafts of one or more throws; the one shown is a triple-throw two-bearing crankshaft. The crank webs are constructed by screwing the head of a grub screw into one of the holes of a Collar so that one half of its shank is left projecting beyond the surface of the Collar. A second Collar is then screwed on to the shank of the grub screw and tightened up so that both Collars are secured firmly. The centre web portion consists of two Collars secured by grub screws to a "spider" removed from a Swivel Bearing, so that they are at right angles to one another. Grub screws inserted in the remaining tapped holes of the various Collars serve to secure in place the crankpins and journals of the crankshaft. The connecting rods consist of Screwed



Stewart Reid, Aberdeen, a keen Meccano model-builder.

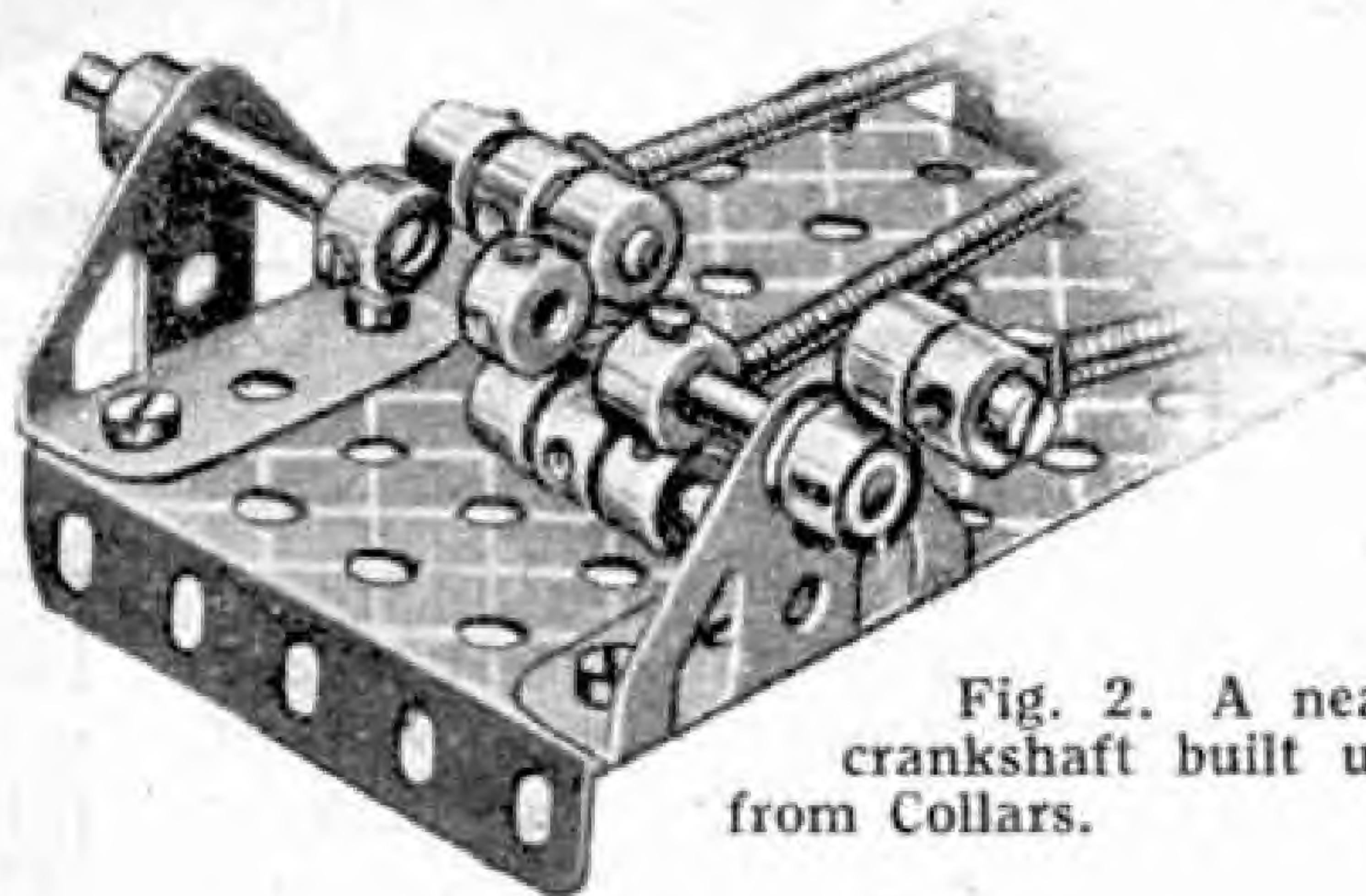


Fig. 2. A neat crankshaft built up from Collars.

Rods partially inserted in the grub screw holes of Collars that turn freely on the crankpins.

Four Wheel Steering Mechanism

Two of the most interesting and important parts of a model car or lorry are the gear-box and the steering mechanism, and this is why so many mechanisms of these types have been illustrated in the

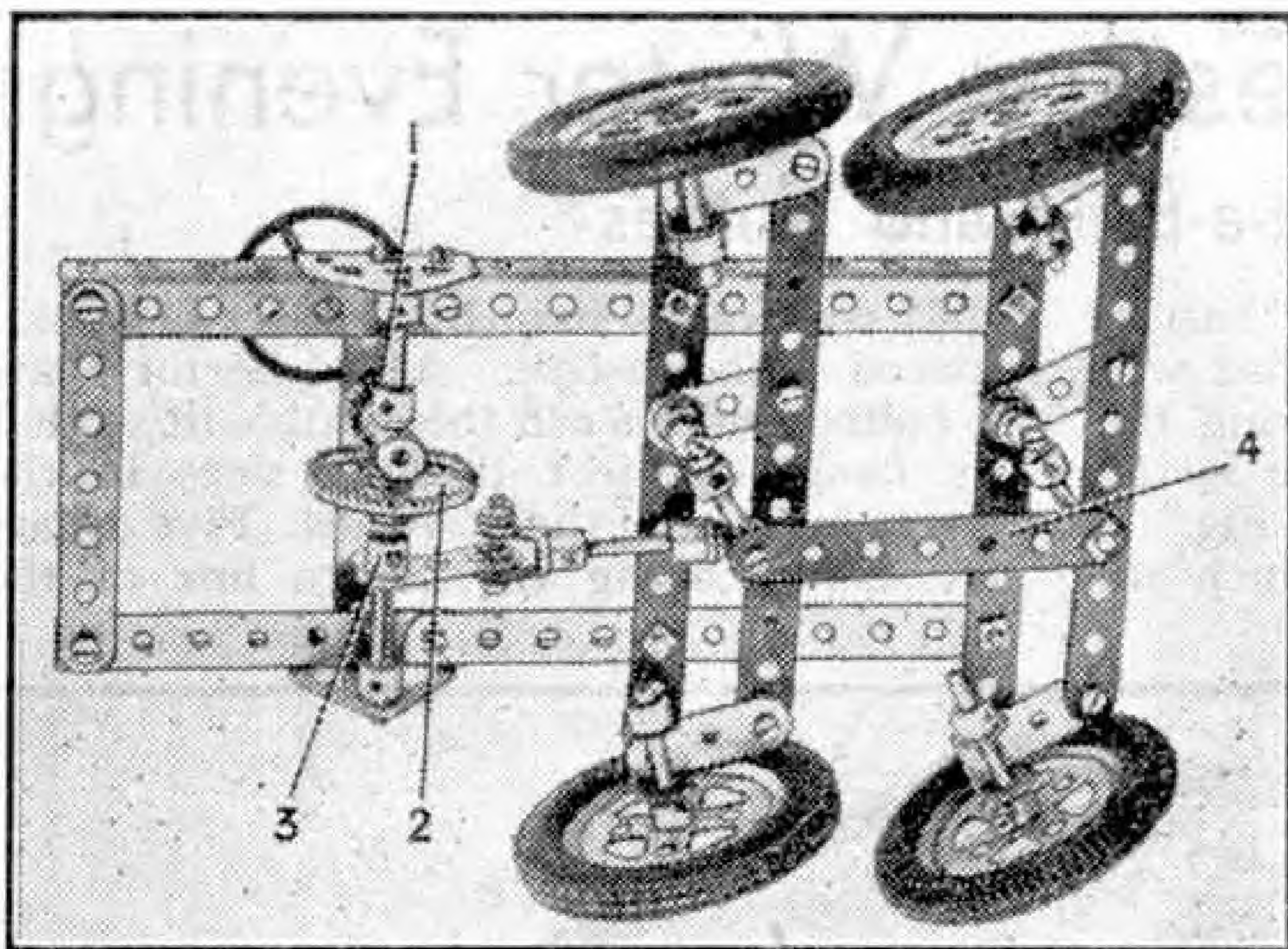


Fig. 3. Four wheel steering mechanism suggested by P. Shaw, Aldershot.

"M.M." in the past. They are always a welcome addition to *"Among the Model-Builders,"* and many readers have written to say how useful they find them.

Still another type of steering arrangement is shown in Fig. 3, and it is intended for use in a model lorry where four wheel control is desired.

The designer, P. Shaw, Aldershot, uses a Double Bracket for the stub axle supports, and obtains rigid tracking control by means of Handrail Couplings and Cranks. The assembly is mounted on Angle Girders and the steering is transmitted by the Pinion 1 to a $1\frac{1}{2}$ " Contrate Wheel 2 that passes the movement to a Crank 3 on the same Rod. This Crank controls the movement of the $3\frac{1}{2}$ " Strip 4 that forms the tracking bar.

Pulley Driving Device

Many model-builders no doubt have discovered the difficulty of transmitting a drive by means of a belt to a Rod that takes a heavy load. A suggestion for overcoming this trouble is to lead the driving cord around two Pulleys mounted on Rods placed an inch or so in front of the Pulley to be driven, the rods of all the Pulleys being parallel. The driving cord thus passes around three Pulleys, and the effect of the arrangement is to give a larger area of cord in contact with the

driven Pulley, thus increasing its grip on the Pulley.

Novel Suggestions submitted by Readers

Among the more interesting suggestions for new parts received recently is one from C. G. Askew, Leeds, who thinks that a useful addition to the existing Meccano range would be a part of the type shown in Fig. 4. He calls this a stub axle bracket, and says that the experimental part he has made for himself has proved useful for an end bearing and for a vertical shaft bearing. The present Rod Socket, however, fulfils most of the functions of this suggested addition, and at present I cannot see that any

great advantage would result from its inclusion in the Meccano range. Readers may have other ideas on the subject however, and I shall be glad to hear from anyone who cares to write to me.

Another interesting suggestion, for a paper guillotine, has been received

from J. S. Craigie, Liverpool. Using three $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates with an Angle Girder bolted along one side for the table of the machine, and a $12\frac{1}{2}$ " Strip as the blade, it provides a useful instrument for trimming

photographic prints. The $12\frac{1}{2}$ " Strip cuts the paper against the edge of the Girder.

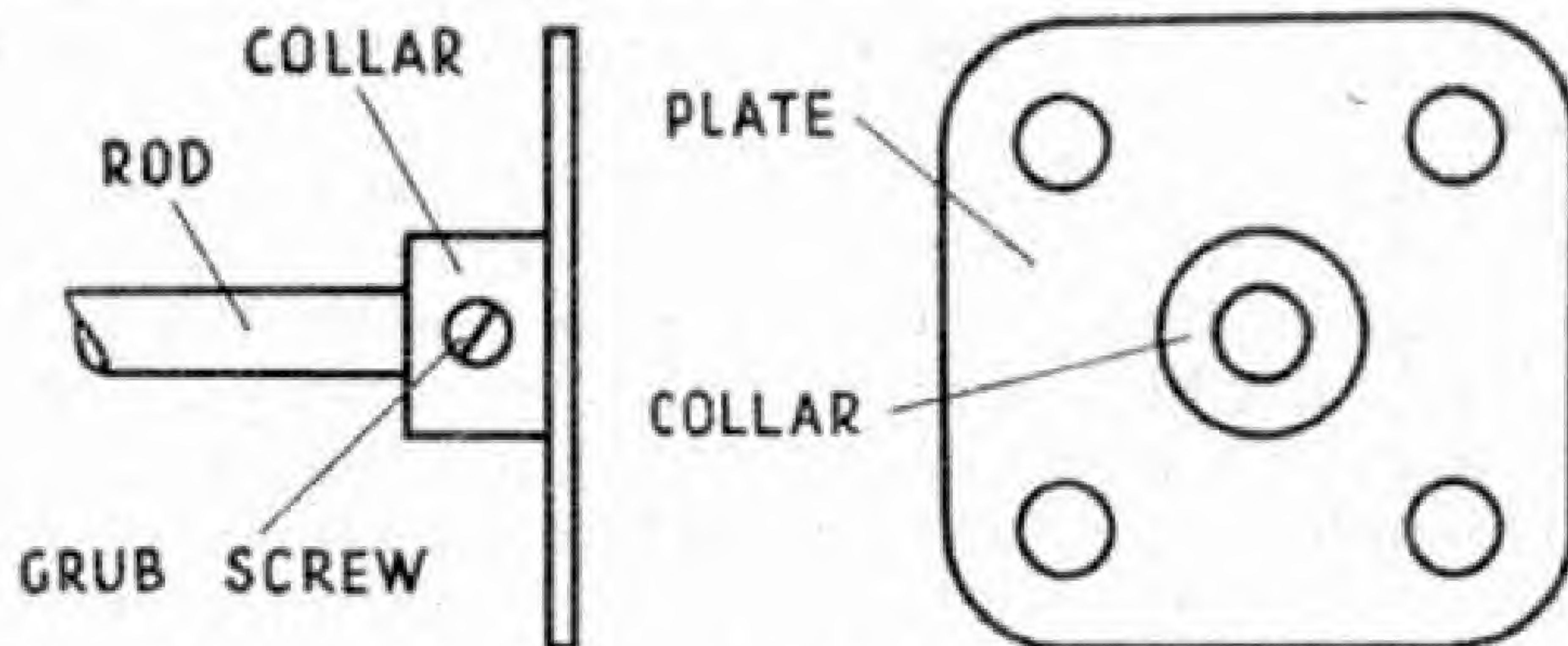


Fig. 4. A suggested design for a stub axle bearing, submitted by C. G. Askew, Bramley, Leeds.

"SEPTEMBER GENERAL MODEL-BUILDING CONTEST" RESULTS (Home Section)

First Prize, Cheque for £2/2/-; S. Reid, Aberdeen; Second, Cheque for £1/1/-; P. D. Hancock, Edinburgh 9; Third, Postal Order for 10/6; W. F. Biddulph, Stafford.

Consolation Prizes of 5/-: O. Stoney, London N.W.7; A. Yeudall, Newmilns; J. R. Christie, Manchester; P. D. Robinson, Sheffield 11; J. E. Matthews, Fillongley; A. B. Partridge, Northampton; B. Williams, Hove; A. Reeve, Melton Mowbray; P. F. Winterburn, Ossett; J. A. Kennett, Gerrards Cross.

"APRIL GENERAL CONTEST" (Overseas Section)

First Prize, Cheque for £2/2/-; T. Longe, Johannesburg, S. Africa; Second, Cheque for £1/1/-; N. J. Rutherford, Sydney, Australia; Third, P. O. for 10/6; P. Giese, Buenos Aires.

Consolation Prizes of 5/-: J. J. Buma, Bussum, Holland; Lars Linder, Göttenborg, Sweden; G. de Jong, Leiden, Holland; M. C. Bayer, Barcelona, Spain.

Meccano Games for Winter Evenings

"Shoot-a-Ball" and Skittles

WE describe this month two easily-built amusement devices that will provide many a jolly evening during the winter months. The first of these is the "Shoot-a-Ball" board shown in Fig. 1. This consists of a baseboard in which are set several pockets, each bearing a number, and a series of baulks. A mechanical "gun" is provided and with this a small ball such as a marble or a ball-bearing is shot up the board, the object being to lodge the ball in one of the numbered pockets.

The framework consists of two $24\frac{1}{2}$ " Angle Girders each extended eight holes by two $5\frac{1}{2}$ " Angle Girders to form the sides 1. The front of the base is a $12\frac{1}{2}$ " Angle Girder 2 that overlaps one hole on each side, and the rear end is a $12\frac{1}{2}$ " Strip.

The cardboard forming the base is held in place by $\frac{3}{8}$ " Bolts, each of which carries Washers. These Bolts also hold in position side girders 3 used to confine the ball to the board. These consist of $18\frac{1}{2}$ " Girders extended 18 holes by $12\frac{1}{2}$ " Girders, and the cardboard at the front end is braced underneath by a $12\frac{1}{2}$ " Strip 4. The rear end of the board consists of an $11\frac{1}{2}$ " compound girder built up from two $7\frac{1}{2}$ " Girders.

Two of the pockets at the top of the board consist of Boiler Ends 5 attached through their centre holes to a $10\frac{1}{2}$ " compound strip built from two $5\frac{1}{2}$ " Strips and a $2\frac{1}{2}$ " Strip. The compound strip is bolted to the framework and the baseboard by Angle Brackets. The large pocket at the top of the board is a 3" Wheel, which is attached to the

$10\frac{1}{2}$ " compound strip by 2" Screwed Rods spaced with washers. A $4\frac{1}{2}$ " Sector Plate is bolted underneath the cardboard so that its flanges project through slots in the board in front of the 3" Wheel. Five collars are bolted along the centre line of the

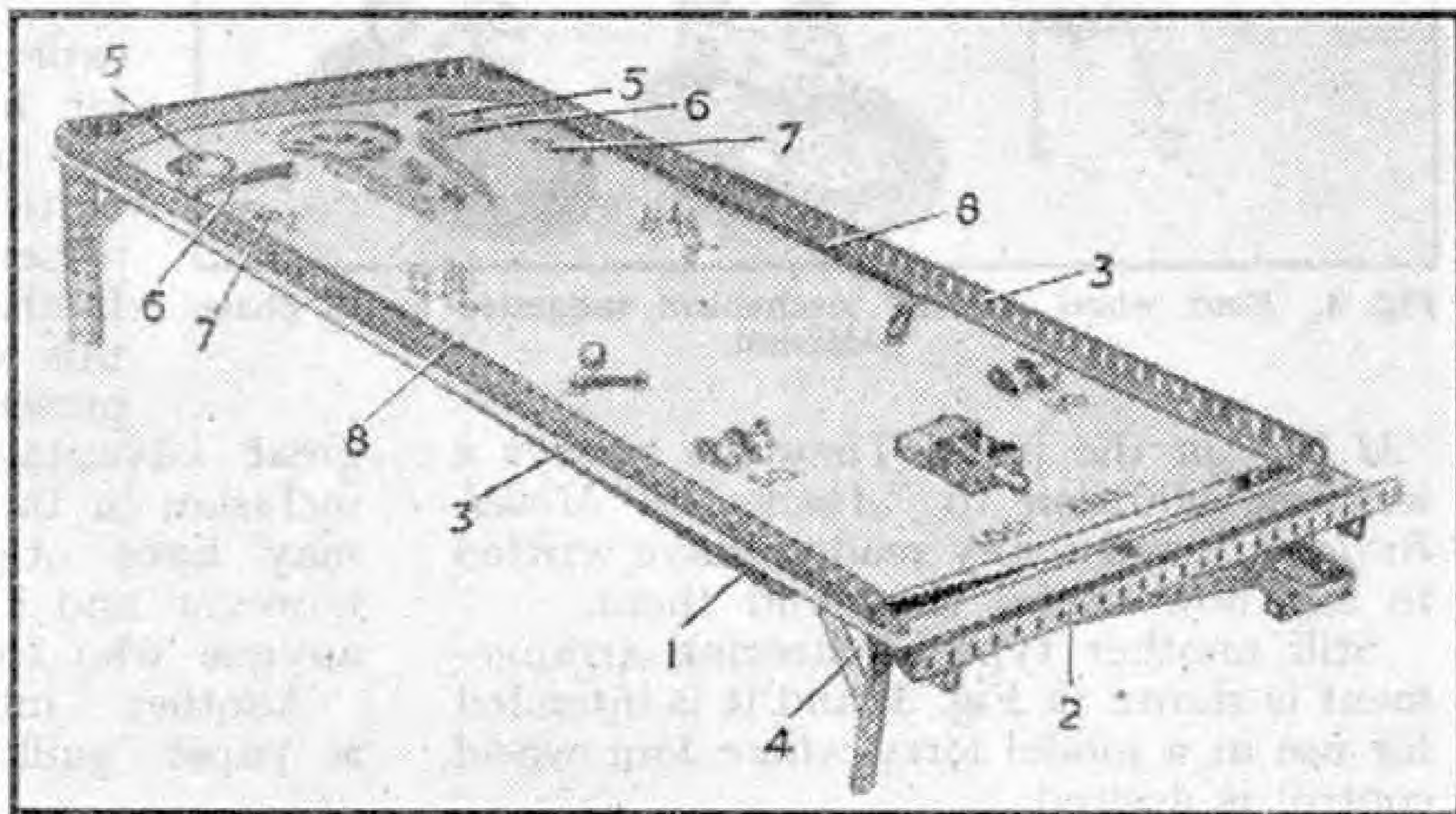


Fig. 1. The Meccano "Shoot-a-Ball" Game board.

Sector Plates as shown in the illustration. A Spring 6 mounted on two $\frac{3}{4}$ " Bolts spaced with Washers is stretched across the front of each Boiler End receptacle, leaving sufficient space between the Sector Plate to allow the ball to pass freely.

Two scoring pockets 7 are $\frac{3}{4}$ " Flanged Wheels, held by $\frac{3}{4}$ " Bolts to $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips attached to the side Girders of the baseboard frame. Five Handrail Supports are used to form each of the pockets in the middle of the board.

Two 6" Driving Bands 8 held on $\frac{3}{4}$ " Bolts are stretched along the sides to form cushions. The ball traps at the front of the board are large Fork Pieces.

A Strip 1" wide is cut from the front end of the cardboard base to form the "lost ball" channel, and two $9\frac{1}{2}$ " Angle Girders form an inclined chute for the balls and guide them into a

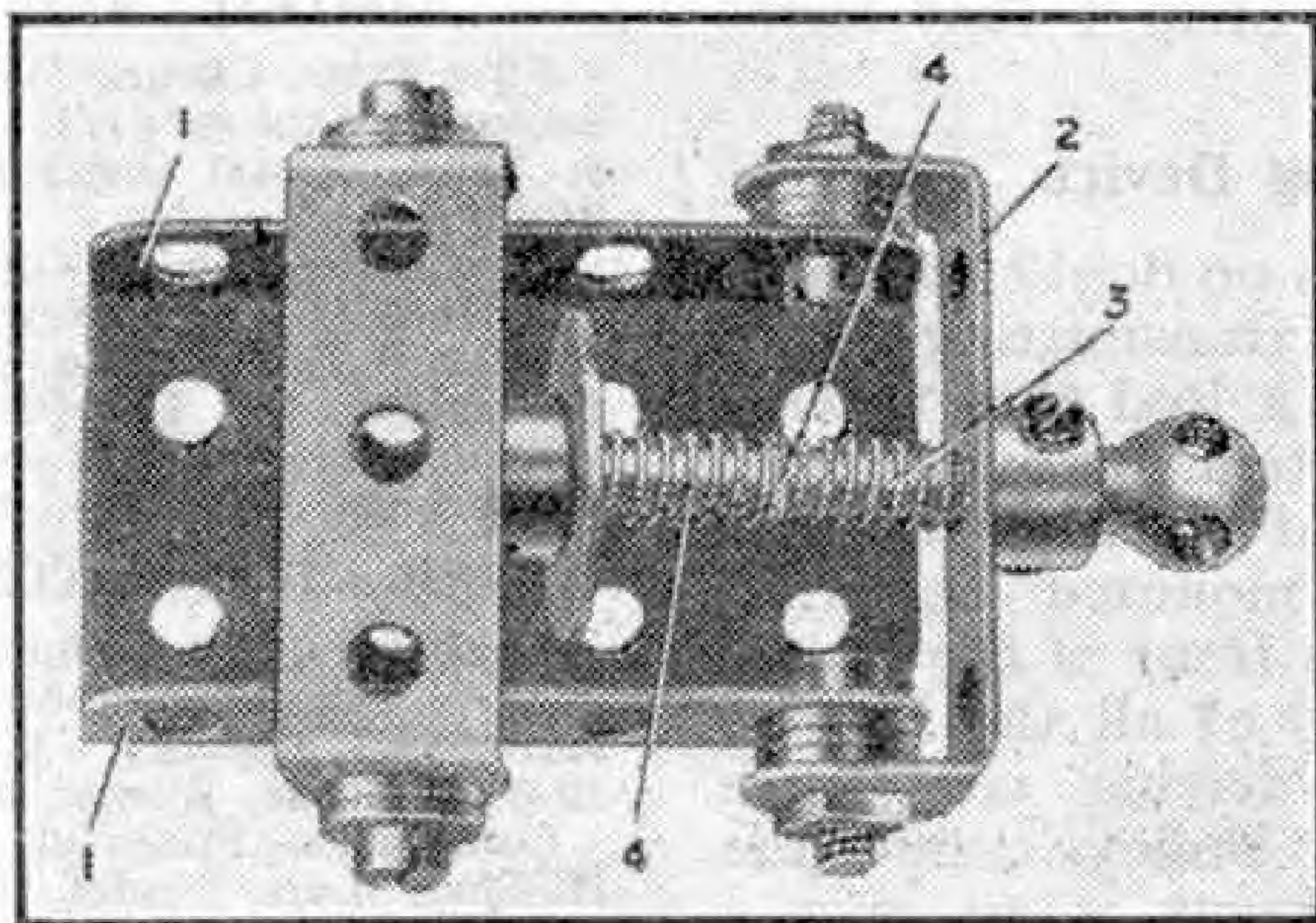


Fig. 2. The gun for use with "Shoot-a-Ball."

$2\frac{1}{2}" \times 1\frac{1}{2}"$ Flange Plate attached to the Angle Girder by a 1" reversed Angle Bracket.

The gun is built from two Girder Brackets 1 joined by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips spaced with Washers. One of the Double Angle Strips 2 is bolted to the back of the gun, and its centre hole forms a support for a 2" Axle Rod 3. This Rod carries two Compression Springs 4.

Parts required for Meccano "Shoot-a-Ball": 2 of No. 1; 2 of No. 2; 5 of No. 5; 2 of No. 7; 2 of No. 7a; 3 of No. 8; 2 of No. 8a; 2 of No. 8b; 2 of No. 9; 2 of No. 9b; 2 of No. 10; 3 of No. 12; 1 of No. 17; 1 of No. 19a; 2 of No. 20b; 50 of No. 37; 25 of No. 38; 1 of No. 38d; 2 of No. 43; 4 of No. 48; 2 of No. 48a; 1 of No. 51; 1 of No. 54a; 6 of No. 59; 1 of No. 81; 12 of No. 111; 9 of No. 111c; 10 of No. 115; 4 of No. 116; 2 of No. 120b; 1 of No. 124; 1 of No. 136a; 2 of No. 161; 2 of No. 162a; 2 of No. 168; 2 of No. 168a.

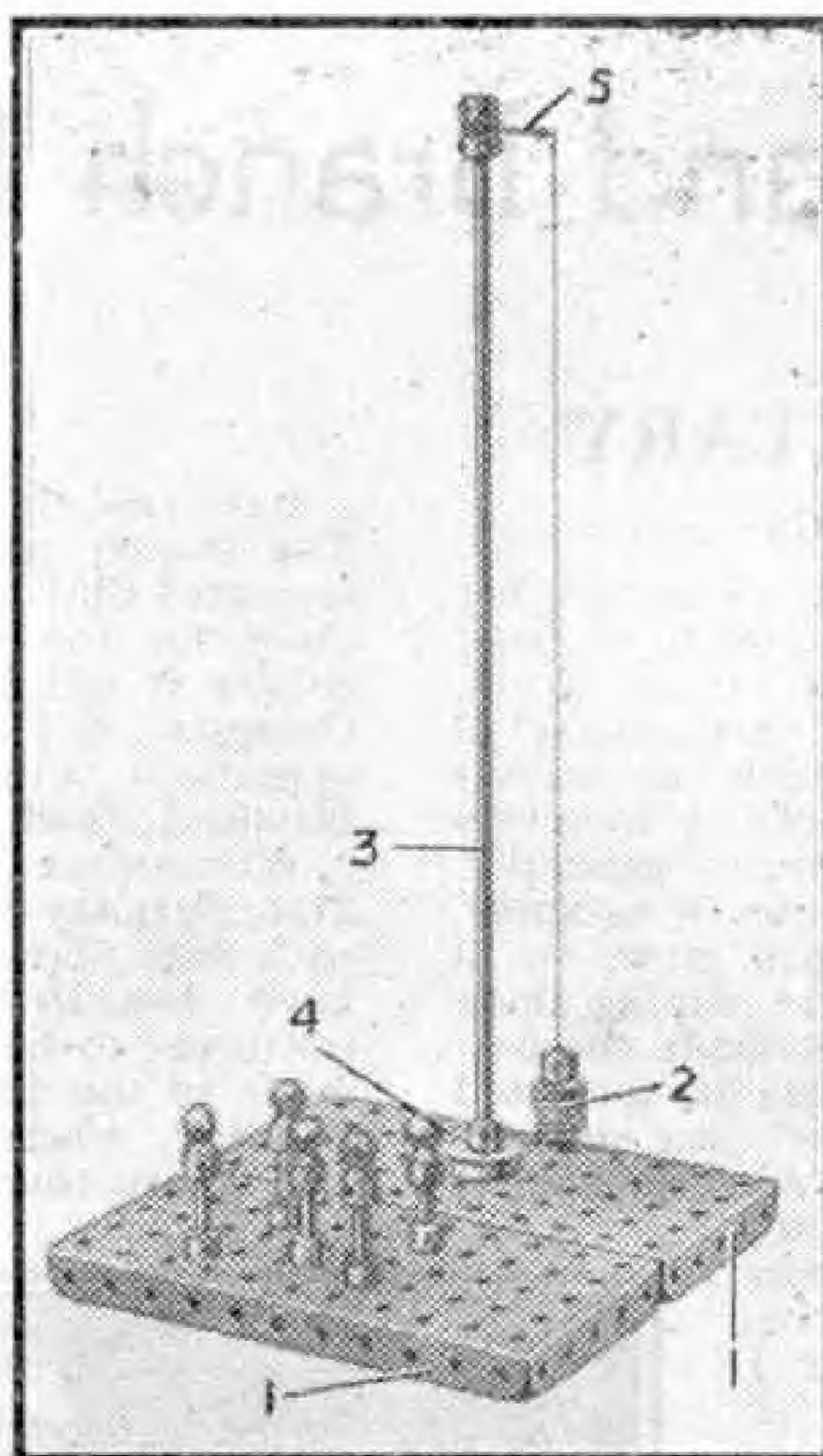


Fig. 3. A jolly Skittle game.

An amusing skittle game is shown in Fig. 3. The base of this is made from two $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plates 1 bolted together by their $5\frac{1}{2}"$ flanges. The flying striker 2 is a Worm and is attached by a length of cord to a vertical $11\frac{1}{2}"$ Axle Rod 3. This Rod is mounted on the base with a Bush Wheel and a $\frac{3}{4}"$ Flanged Wheel 4, and the cord is attached to a Fishplate 5 at the top of the $11\frac{1}{2}"$ Rod mounted between two Collars and Washers. Each of the five skittles is made from a 2" Rod, a Handrail Coupling, and a Collar, and these are assembled as shown in the illustration, with the Collar forming the base of the skittle.

Parts required for the Skittle Game: 1 of No. 10; 1 of No. 13; 5 of No. 17; 1 of No. 20b; 1 of No. 24; 1 of No. 32; 3 of No. 37; 2 of No. 52; 5 of No. 59; 5 of No. 136a.

Prizes for Meccano Models

This competition gives every model-builder a chance to win a fine prize, and there are no difficult conditions to fulfil. Models may be of any kind whatever and of any size, but they must be built from Meccano parts. Cranes, motor vehicles, ships, machines of all types and aircraft are some of the many suitable subjects.

Readers who are new to the Meccano competitions are specially asked to note that *the actual model must not be sent*. A photograph, or if this is not possible, a good sketch, together with brief details of the model's main features is all that is required.

The competition will be divided into two sections. A, for competitors of all ages living in the British Isles; B, for competitors of all ages living Overseas. Section A will close for entries on 28th February, but the Overseas Section will remain open until 30th June.

The following prizes will be awarded in each

Section of the Contest: First, £2/2/-; Second, £1/1/-; Third, 10/6. There will be also a number of consolation awards.

Competitors must write their name, address and age, on the back of each illustration sent in, and envelopes must be addressed "Winter" Model-Building Contest, Meccano Ltd., Binns Road, Liverpool 13.

Prize-winning entries become the property of Meccano Ltd., but unsuccessful entries will be returned if a stamped addressed envelope is sent.

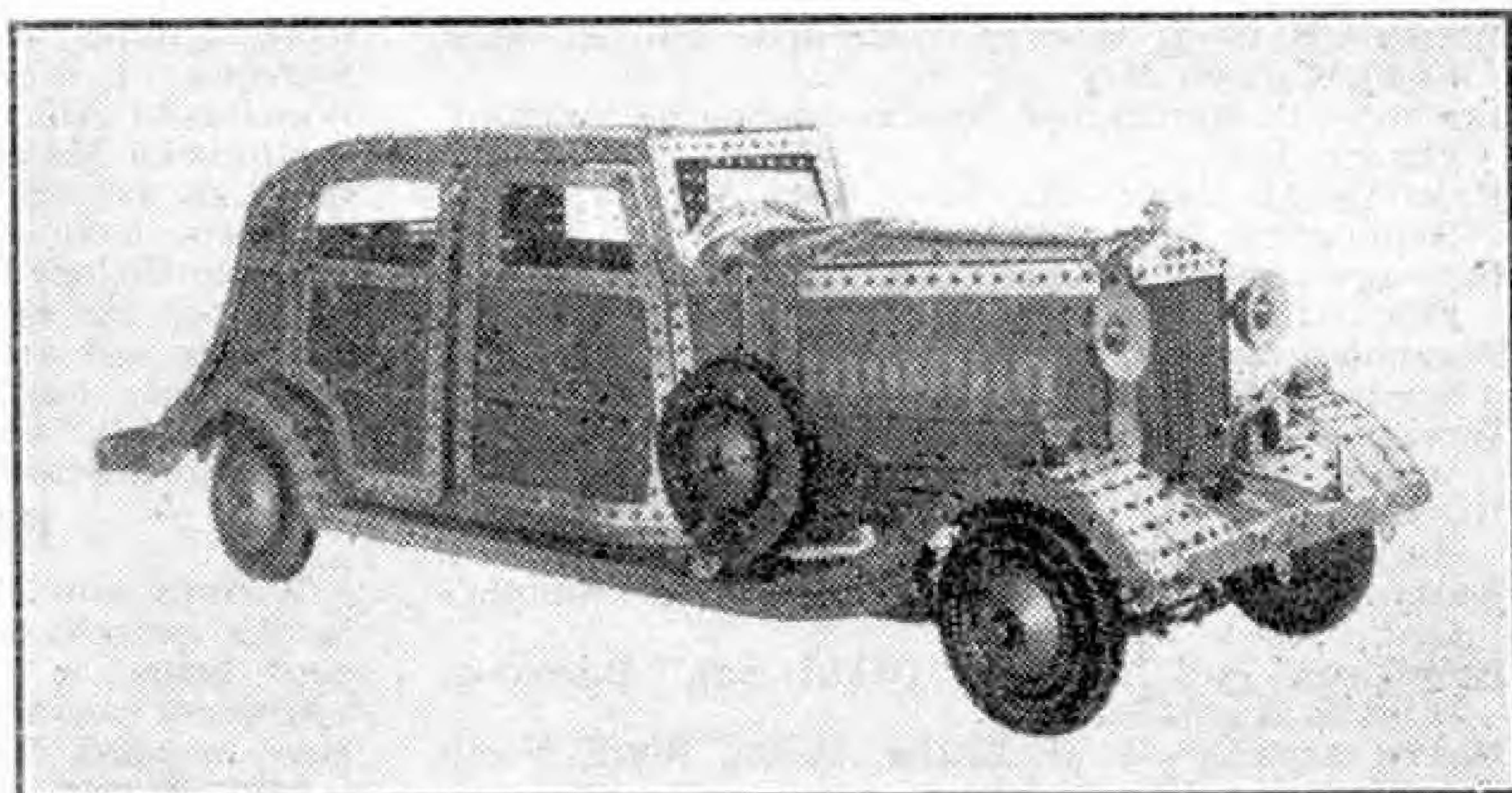


Fig. 4. A fine model of a Rolls-Royce car built by J. Matthews, Fillongley.



Club and Branch News



WITH THE SECRETARY

NEW YEAR GREETINGS

A happy and prosperous New Year to every member of the Guild and the H.R.C.! I have already received greetings from members in all parts of the world, and I wish to take this opportunity of thanking all those who have taken so much trouble to express their good wishes to myself, their fellow members and the Guild and H.R.C. movements generally.

The past year has certainly been one of progress. Membership of both organisations has grown to a remarkable extent and applications are coming along in increasing numbers. The Guild has made the best showing. The number of actual members has increased by nearly 15,000, and the new members are showing their keenness and interest by their correspondence, which is keeping myself and my increasing staff continually busy. Many new Clubs are in process of formation and old Clubs are being revived, but I would like to see more activity of this kind. Finding a good meeting place or Club room is perhaps the greatest of the difficulties with which the founders of Clubs have to contend. This can be overcome by arranging meetings in the homes of members. The plan involves some informality and perhaps subjects a club to restrictions of various kinds, but these can be accepted cheerfully. The important thing is to make a start, and it is better to do this on a limited scale with a sure hope of success than to plan an organisation that is too ambitious. This applies also to Branches, and I look forward to a great improvement in the position of the H.R.C. during the coming year.

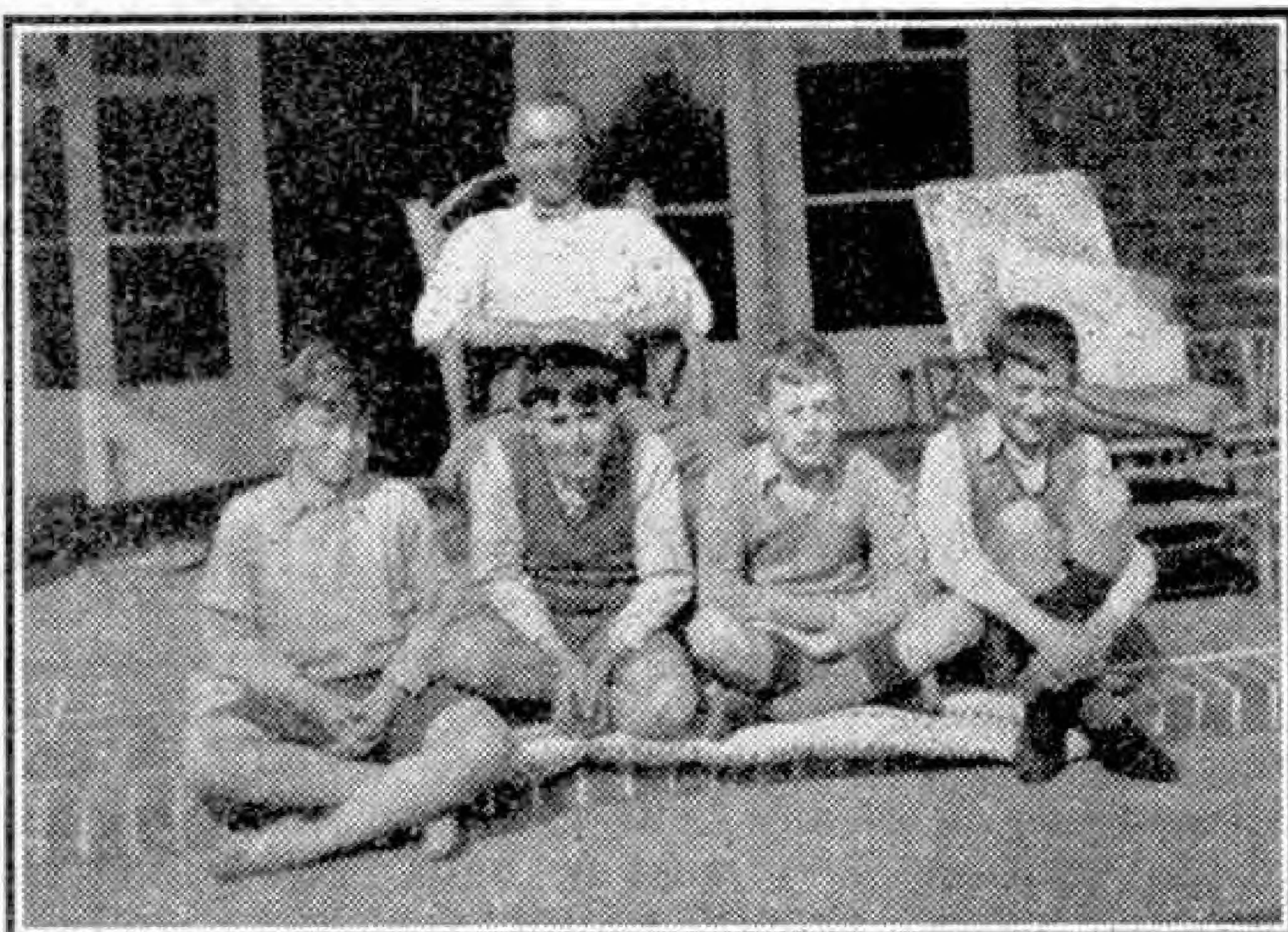
PROPOSED CLUBS

- BOSTON—G. Allam, 26, Castle Street, Boston.
 DARLINGTON—E. Lodge, 57, Borough Road, Darlington.
 CLEETHORPES—Mr. D. Headland, 63, Cambridge Street, Cleethorpes.
 JOHANNESBURG—Mr. Lorimer, 36, Harley Street, Yeoville, Johannesburg.
 NEWCASTLE-ON-TYNE—C. Forester, 37, Dane View, S. Gosforth, Newcastle-on-Tyne 3.
 COLWYN BAY—J. Whinay, Glenhurst, 116, Abergele Road, Colwyn Bay.
 LONDON—G. Martin, 194, New Road, South Chingford, London E.4.
 HEMINGFORD GREY—R. Fox, The Abbey School, Hemingford Grey, St. Ives, Hunts.
 FRECHEVILLE—J. Sendall, 2, Brushfield Grove, Frecheville, Nr. Sheffield.
 SCARBOROUGH—Mr. N. H. Forrester, Osgodly Lane, Scarborough 11.
 WINDSOR—Ian Davis, Haileybury School, Glewer Manor, Windsor.
 BAGSHOT—D. C. Bradbury, Hero of Inkerman, Bagshot, Surrey.
 AMMANFORD—G. B. James, 67, Tirydail Lane, Ammanford.
 BURRADOO—Mr. J. Quick, "Bhai-Bundi," Burradoo, N.S.W., Australia.
 NORTH ASHTON—G. H. Littler, Billing Road, North Ashton, Nr. Wigan, Lanes.
 KEGWORTH—Mr. L. P. Conduit, Market Place.

CLUB NOTES

BARKERS' BUTTS BOYS' SCHOOL (COVENTRY) M.C.—The Winter programme was started with a largely increased Club roll. Models have been built in preparation for the Club's Annual Exhibition and keen rivalry is being shown in the weekly Model-building Contests. A Hornby Train Section has now started operations. Club roll: 70. *Secretary:* D. L. Eyre, 85, Batsford Road, Coventry.

WINCHMORE HILL COLLEGIATE SCHOOL M.C.—The 21st Birthday of the Club was celebrated by a Sale, with Side Shows and Refreshments, and Club Funds have benefited greatly. Model-building interest continues to be intense. A delightful Excursion was made to the aircraft factory of Miles Aircraft Ltd., Reading, where members were hospitably received and shown round. Club stock is to be increased and



Mr. R. S. Evans, Chairman of the Craigwell (Bognor Regis) Branch No. 492, Secretary, J. S. Evans, with some of his members. This Branch was incorporated in May 1946. It is a good example of a small friendly organisation in which an ample layout is built up by members, who enjoy more extensive and interesting operations than if they ran their trains separately. Timetable working of both passenger and goods trains is the main programme feature, and cycle runs also are enjoyed.

more Outings are to be arranged. Club roll: 31. *Secretary:* J. F. Bartholomew, 7, Rowntree Road, Winchmore Hill, London N.21.

HORNSEA M.C.—A special feature continues to be the high average attendance at meetings. Younger members have enjoyed an illustrated story, and Talks on Biology have been given. Models constructed have included excellent working miniatures of farm machines and a light anti-aircraft gun. Film Shows and Games continue to be special attractions on Social Nights. Club roll: 53. *Secretary:* D. Kitching, 25, Clifford Street, Hornsea.

BRANCH NEWS

WIDNES AND DISTRICT—Good work is being done in the construction of coachwork, scenery, etc. A good layout is in operation on Track Nights, and additional construction is planned. Other attractions have included Table Football, and a Stamp Section is being formed. *Secretary:* R. Hindley, 146, Peelhouse Lane, Widnes, Lanes.

A Useful Dublo Track Formation

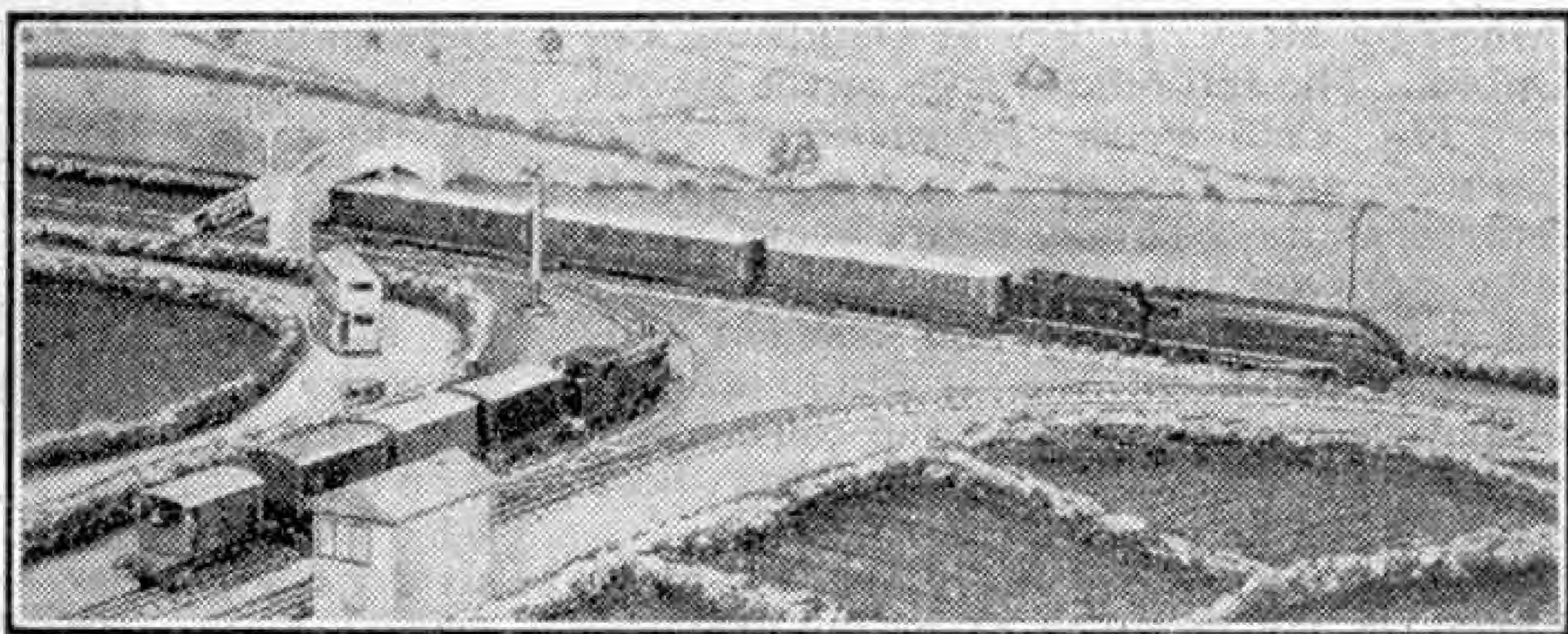
IN the development of any miniature railway system from the plain continuous track with which operations are usually begun, a frequent step is to add a terminal station to the layout. The diagram shows a useful Hornby-Dublo formation that can be used in conjunction with a simple type of continuous layout. The main track of the latter is assumed to run horizontally across the top of the diagram, while the branch leading to the terminal consists of the pair of vertical tracks in the centre of the page.

The up and down branch tracks will need to be connected by crossover points, so that trains in either direction can pass readily from one to the other. Thus these two tracks have to be set at the standard distance apart for double track on Dublo layouts. This is readily arranged by laying the track exactly as shown in the diagram. Beginning at the top left-hand corner of the diagram, we find that the right-hand points there are separated by two standard straight rails from the corresponding left-hand points. To complete the curved branches of these points, which eventually veer round to form the straight terminal tracks, we add to each set of points a standard curved half rail, then a standard short rail, then a full curved rail. Then the converging curves lead to parallel tracks that run at the correct distance apart.

On these parallel tracks that form the start of the terminal section it will be seen that two sets of crossover points are included. This makes it possible for a train that approaches from the left-hand or right-hand main line points to reach either of the main terminal tracks without difficulty. Similarly a train leaving the terminus can be directed to the right-hand or the left-hand junction with the

main line, according to its supposed destination. Thus the complete arrangement resembles a triangular junction layout.

Another useful feature is that this layout forms a useful means of turning round



A junction arrangement similar to that referred to on this page, in use on a Hornby-Dublo layout. An express runs along the main line while a goods train slowly draws up to the stop signal.

either arriving locomotives or complete trains, ready for their next journeys from the terminus. Let us see how this scheme works out. We will assume that the train is running from left to right on the main track, and is approaching the right-hand points leading to the terminus. Here it is diverted over one leg of the triangle, and in order to reach the up or left-hand road of the terminal branch, and

so gain the correct arrival platform, it takes the upper

set of crossover points in the diagram and continues along the arrival track.

After platform operations have been completed we shall probably want to start the train off on its return journey. The engine therefore backs the train out over the same route that it followed in entering, until it is again standing on the main line. Now the train runs straight across from left to right in the diagram until the tail of the train is clear of the points at the right-hand end. If the way is clear it can now be backed into the station over the other curved branch, and it will take the lower set of crossover points in the diagram in order to reach the departure platform. It will now be ready to set off again on another journey.

Light engines released from arriving trains can be turned in a similar manner.

The "Churchtown" Railway and Tramway

THE model locomotives and rolling stock referred to in these pages last November that were used as part of a special exhibit by the G.N.R. (Ireland) belong to a remarkable Gauge 0 miniature railway owned by Mr. C. L. Fry of Dundrum, Co. Dublin. The full official title of the layout is "*The Churchtown International State Railway and Tramway System*," and it represents the result of many years' spare time work on the part of the owner and his wife; for Mrs. Fry has taken a considerable part in the creation of the miniature city and indeed the countryside which the transport system has been designed to serve.

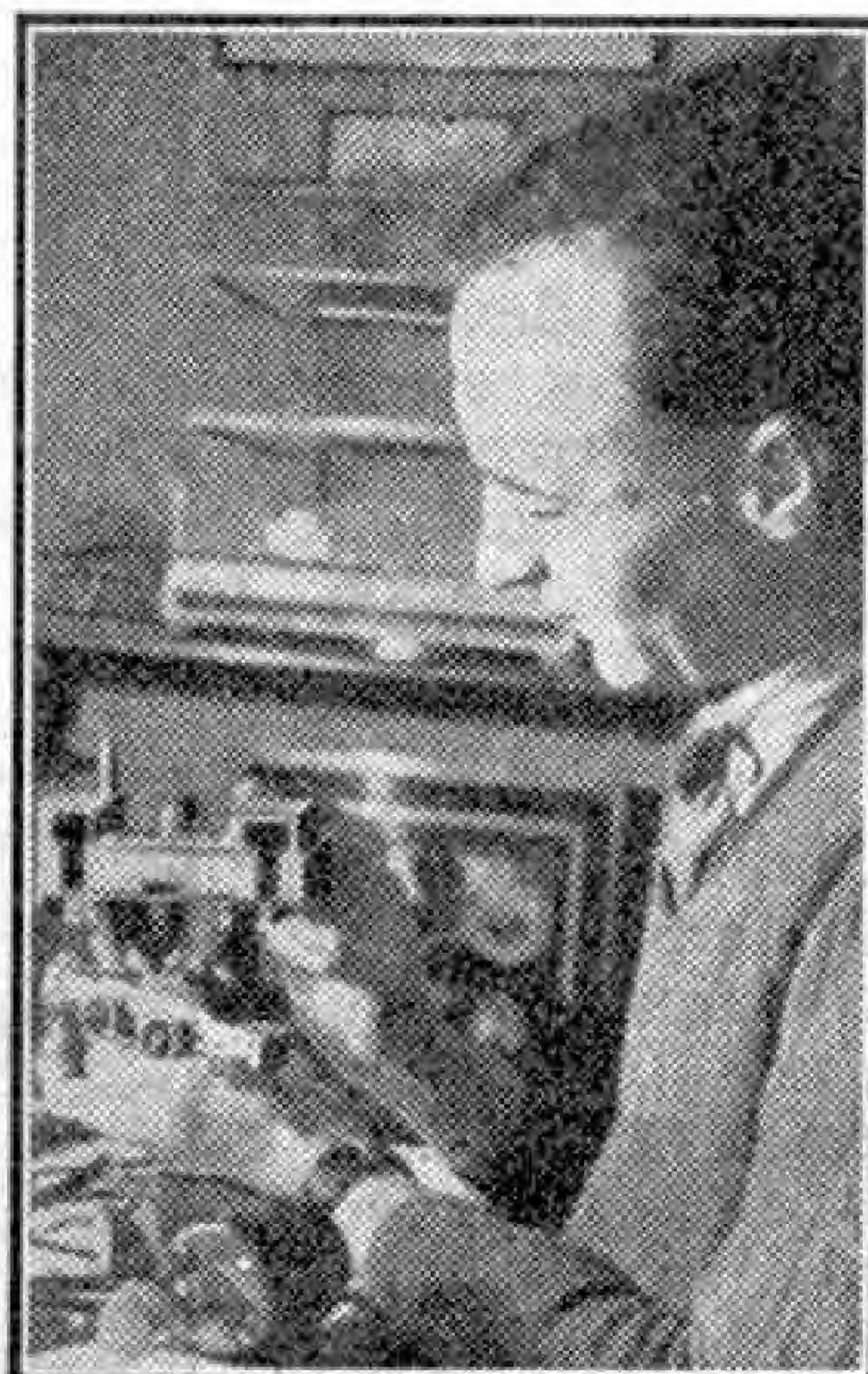
In general the layout is oval in form, but it is far removed from an ordinary continuous track. Continuous running is possible, and there are three passing or intermediate type stations. In addition there are four terminal stations of varying size and importance. Chief of these is known as "*New City*" and here the principal trains that run on the layout begin and eventually finish their journeys, for there is a "return" or diagonal track incorporated in the layout design that makes "there and back" runs possible.

There are various levels incorporated in the system as a whole, so that with the "flying" and "burrowing" connections

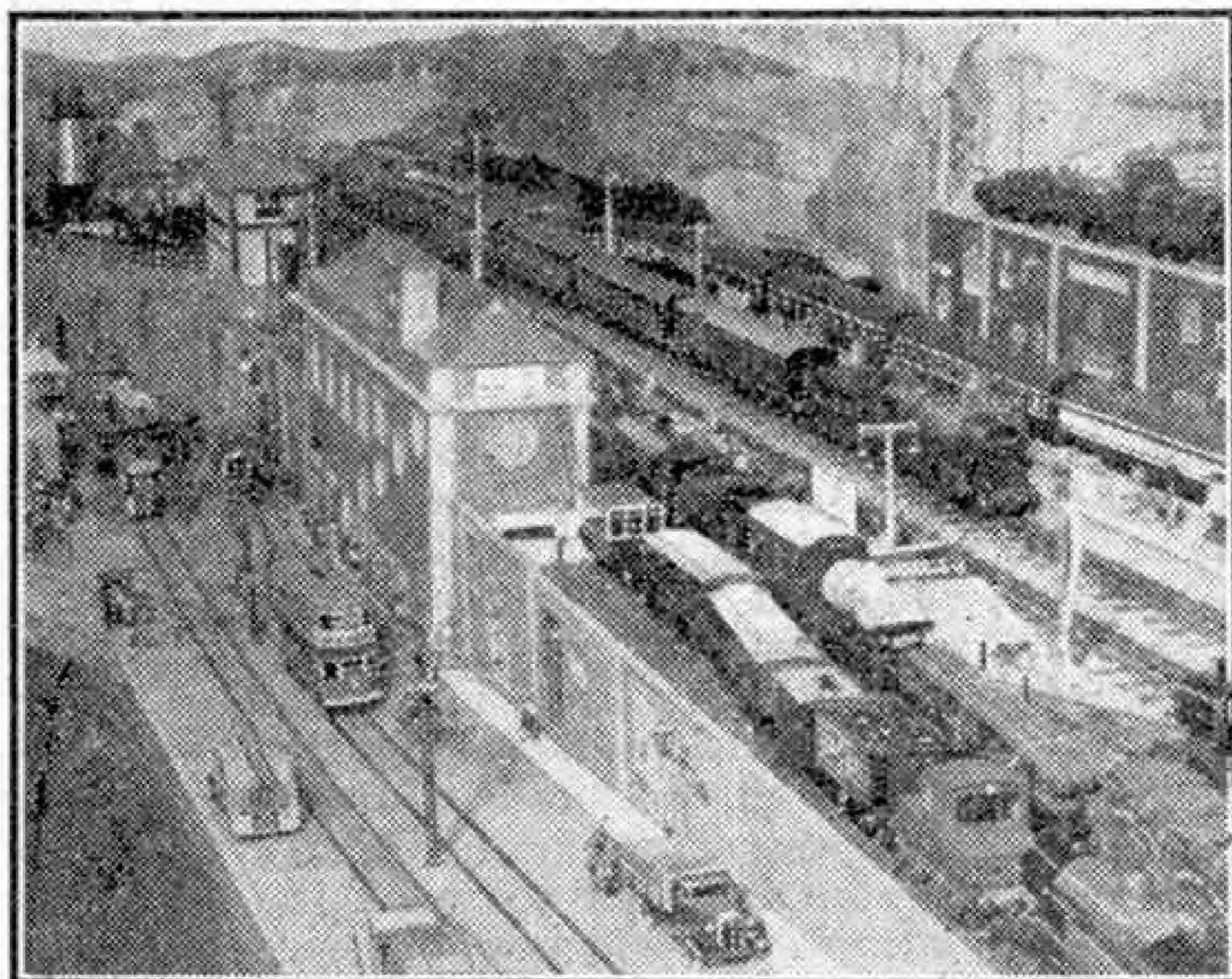
necessary the appearance of the railway is much more interesting than would be the case with an all-level line. There is in fact a series of "under-ground" storage sidings where stock not required for running can be held. The underground section also includes one of the passing stations mentioned previously.

As might be expected, the points and crossover connections, especially in the neighbourhood of "*New City*," and "*Churchtown Junction*," the focal point of the system, are fairly complex. Points operation is arranged from control frames situated in signal boxes in the proper manner. Some points are electrically operated, while others are spring-controlled. For control purposes the layout is divided into sections, current being fed to these or cut off as required by means of switch levers banked in groups. There are, in all, nearly 100 signal and control levers.

Semaphore and colour light signals are in use and automatic operation by means of track circuits provides for safe working when there are several trains on the line at once, as is usually the case. A fascinating installation is the level crossing where the gates are automatically controlled. Normally these are open to the trains; but the presence of a tramcar on the miniature tramway which crosses the railway at this point causes a buzzer to sound in the crossing-keeper's hut, and the railway signals to go to "danger." Then the gates close to rail



Mr. C. L. Fry with an unusual model, a double-cab steam tramway locomotive. Photograph by courtesy of the "Times Pictorial."



The station and tramway terminus at "Churchtown Junction" showing road and railway traffic, including the "Cork Mail" that is seen arriving at the far platform. "Irish Press" Photograph.

traffic, one at a time, and the tramcar can pass on. A train approaching now will be halted and will not resume its journey until the reverse process has been gone through and the signals show "line clear."

Other automatic operations connected with train running include slip-coach working and the picking up of mail pouches from a lineside apparatus. One turntable works without any handling from the operator, things being so arranged that the engine runs on to the table and stops; the table turns the engine and when the movement is complete the engine runs off again.

The "Churchtown Railway" is well



"Herbert Hill," a branch terminus. Note the coaling plant with wagon tippler in the left foreground; the plant is a working model. "Irish Press" Photograph.

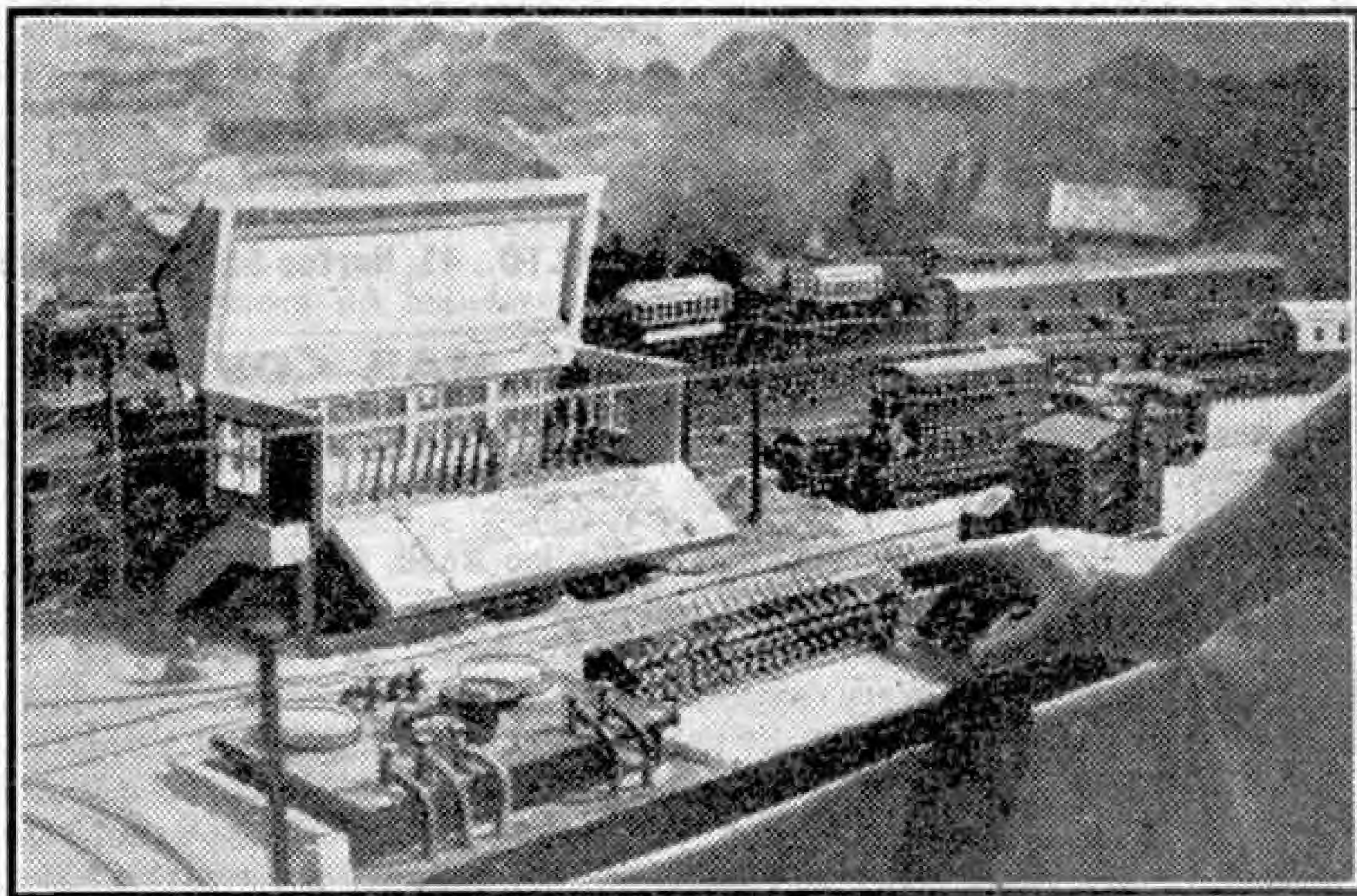
illustration of "Churchtown Junction," is headed by an impressive model of the big Great Southern 4-6-0 No. 800 "Maeve." Rosslare and Killarney expresses with typical rolling stock are run and there are numerous individual pieces of stock representing special and historical vehicles.

In addition to the modern engines and trains referred to on page 472 of the "M.M." of November 1946, the G.N.R. (Ireland) is represented by a 4-2-2 "single-driver" express engine of 1885 and appropriate rolling stock. In striking contrast to this is a two-car articulated diesel unit, the engine portion separating the two passenger vehicles.

American, French and British practice also are exemplified respectively by a diesel streamliner, a Nord "Pacific" and such well-known engines as the L.M.S. class 7 4-6-2 "The Princess Royal," L.N.E.R. "Flying Scotsman" and S.R. "Lord Nelson."

The tramway and road run parallel to the railway and serve "New City" and "Churchtown Junction." The operation of the tramway system is entirely automatic and continuous, for at each end of the run is a "roundabout" loop. Current is fed to the cars through trolley poles by way of power wires suspended from tramway type standards.

Dublin and other tramway vehicles are represented, some modern and some older open-top cars. Motor traffic and a typical jaunting car complete the scene.



The signal box at "New City" opened up to show the mechanical lever frame. The electrical control switches are prominent at the edge of the baseboard. Photograph by courtesy of the "Times Pictorial."

named "International"; for not only do the trains that run on it represent the progress in Irish rail travel over the course of years, but modern and some ancient stock of other railways also is included. The bulk of this, like most of the railway and its equipment, has been constructed by Mr. Fry in his own workshop. Dealing with the natives the first, the crack "Cork Mail" of the Great Southern route is reproduced even down to its bi-lingual destination boards. This train, seen in the

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(All Commemoratives)	(All Commemoratives)
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TWEEZERS. Sheffield made nickel-plated, 5 in. long, 2/9

BURMA. Victory set, 4 complete mint (obsolete), 1/3

AUSTRALIA. Michael Centenary set complete, mint, 1/6

For other Stamp Advertisements see also pages 42 and xi.

WAR LEADERS' PACKET FREE



President Roosevelt, the famous statesman and War leader, Hitler and Mussolini, the infamous and treacherous demagogues, are included in this truly historical packet of fine stamps. Stamps from the U.S.A., Czechoslovakia (late President

Masaryk), British Colonials, French and Italian pre-war issues, also inflation overprinted stamps issued after the first world war. Very old Bavarian Railway emission and finally a fine portrait stamp of Marshal Petain, now a prisoner in France, and a splendid unused stamp issued by General De Gaulle. This wonderful offer will definitely not be made again as these fine stamps are obviously in very limited supply. SEND IMMEDIATELY 3d. for postage requesting our famous approval sheets.

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Stamp Collecting

The Album Display

By F. Riley, B.Sc.

WHEN the collector has gathered his first stamps together, he is eager to set about the task of displaying them to advantage in his album. At this point it may be remarked that stamps should not be left lying just anywhere until the time comes for mounting them. They should be stored carefully, preferably in small transparent envelopes, which are now more easy to get, and give the necessary protection. The album itself also is worthy of care. It is handled frequently by its owner, and if in addition it is just left throwing about it will soon become dilapidated in appearance. Albums that are in boxes when bought should always be kept in their containers between stamp mounting and examining sessions, and a cardboard box of suitable size should be provided for others. A good wrapping of brown paper also is recommended.

With an album in which separate pages are allotted to different countries, and in which squares for the stamps are marked on the pages, the arrangement of the display is simple, but even here a little forethought is necessary. The usual plan is to have the stamps in date order, and to place those within each set in order of price, the lower values first. If any particular stamps in such a series are missing it is as well to leave spaces for them from the beginning. This saves pulling out and re-mounting when a missing stamp is added to the collection, and the "holes" remind the collector to complete his set at the earliest opportunity.

With loose leaf and other albums a little more can be done to ensure attractive pages. As far as possible a distinctive pattern should be worked out for each, and pages that follow each other should be arranged differently in order to prevent the feeling of boredom that would afflict most of us if a succession of pages looking exactly alike were turned over in front of us. Variety on the page itself can be given by varying the number of stamps in the rows, following up a row of say five stamps by one containing four, three or two, with yet a different number of stamps in the next row. Balance is important, especially with pictorial stamps. One way of achieving it is to place stamps on the right-hand side of the page in positions corresponding with those on the left, with those at the bottom reflecting the stamps at the top. Another way is to arrange the stamps on lines radiating from the centre of the page, with perhaps one of the stamps on the centre spot itself. On occasions a combination of these methods can be used to give balance and to present an attractive appearance. A good example

is the page from the loose leaf album of a keen collector that is reproduced on this page. Here the entire page is devoted to a single set, the New Zealand Peace issue of last year, and the general layout provides an excellent model for the beginner.

Most loose leaf album sheets, and the pages of many ordinary albums, have printed on them a faint pattern of squares, which is always referred to as the "quadrille." This is a very great help in deciding upon a symmetrical and balanced arrangement, for the centre of the page can readily be found by simply counting squares, and the distances between the stamps can be adjusted as required without difficulty. In general this distance should be not less than the width of the stamps themselves, and the average album page should have not more than 18 stamps on it. Overcrowding must be avoided if each stamp is to show its points.

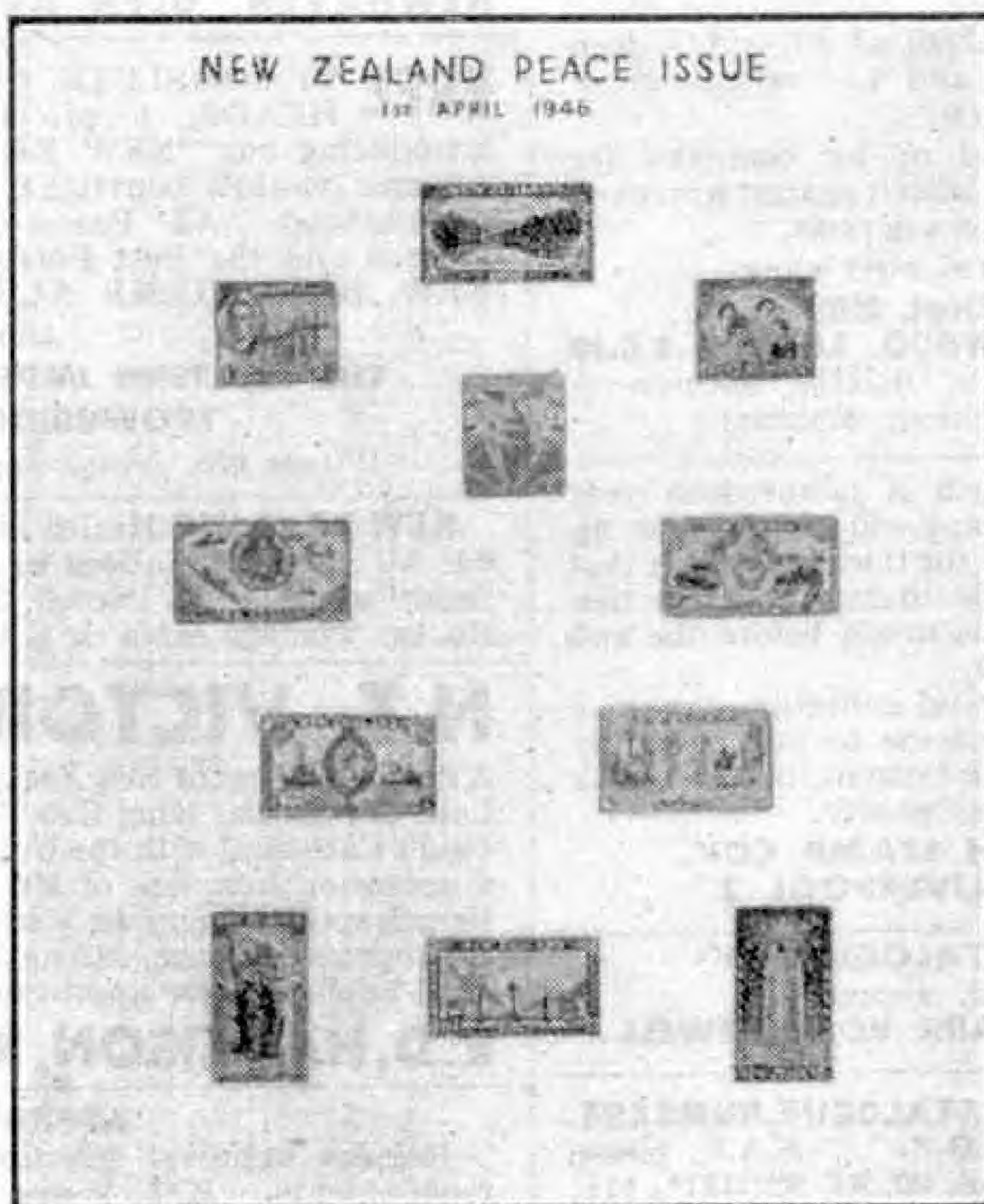
While most collectors at times have to deal with individual stamps, they are more often concerned with sets, especially where modern stamps are concerned, and the greatest care should be taken to mount the stamps of each set in such a way that they can be studied as a whole. Long sets such as the New Zealand set illustrated here should be given an entire page. With really short sets, say of two,

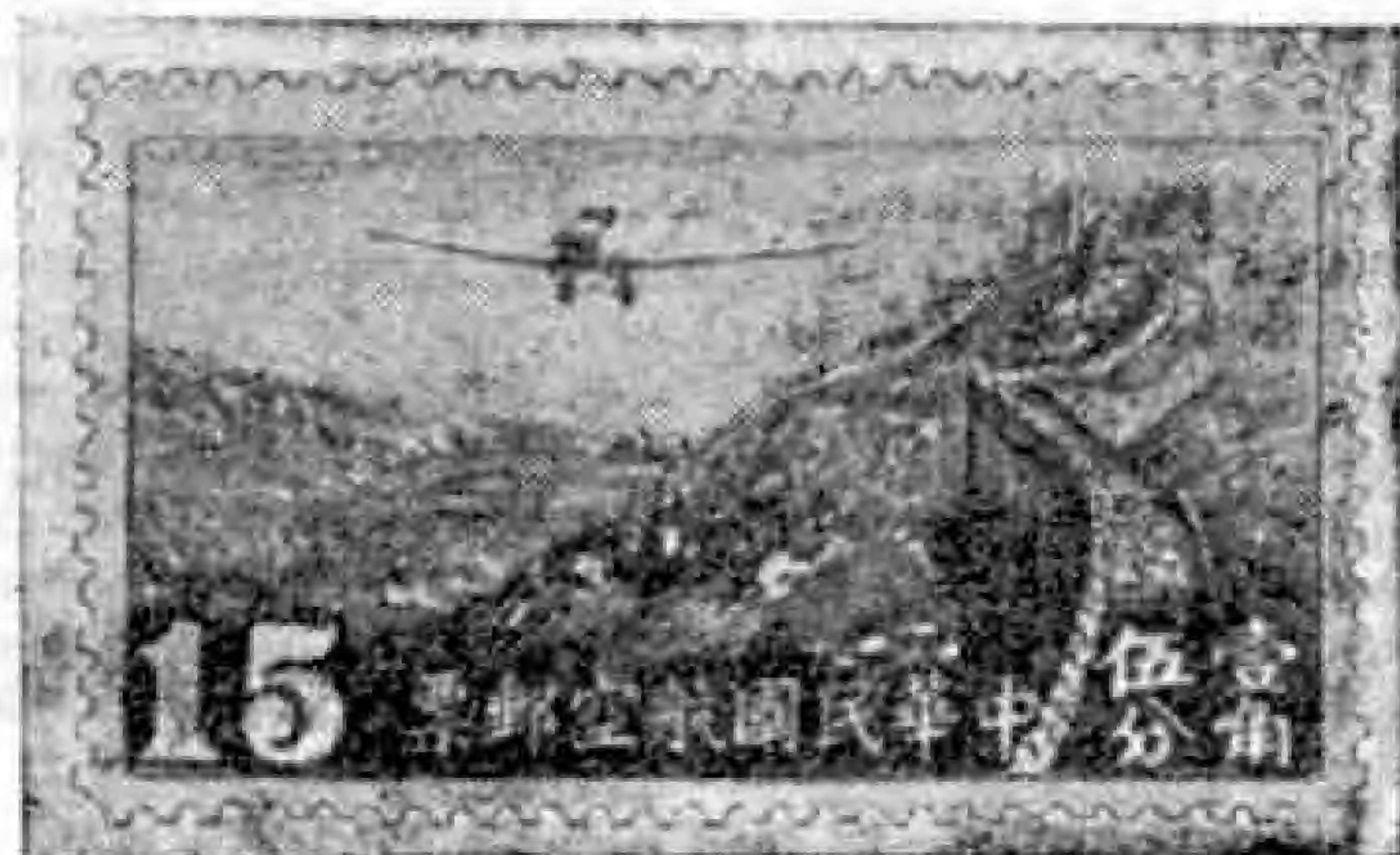
three or even four stamps, more than one set can readily be accommodated on a single page, but they must be clearly separated in some way. Perhaps the best is to enclose each set within a panel formed by drawing a neat rectangle around it.

This brings us to the matter of "writing up." With small albums in which the headings are printed, and squares are left for the stamps, there isn't much opportunity for writing up, but the larger albums and those with loose leaves offer more scope. Collectors with plenty of time on their hands, and who are possessed of some artistic skill, can decorate their pages very finely indeed. They should remember that the stamp is the thing, however; too much ornament would spoil the album as a display of stamps. There is little danger of this

with most of us, who have to restrict writing up to simple block lettering, such as that used on the album leaf illustrated on this page. Those who think that even this is beyond them need not worry, for ordinary handwriting will do, and nothing will be lost if the wording and its position are carefully planned. Planning indeed is everything; each page as a whole, in regard to both stamps and writing up, should be carefully thought out before actual mounting is begun.

Another point that must be decided is how much to include in the writing up. The country and description, that is whether commemorative, charity, etc., should of course appear, and beyond that the only details to consider are the date of issue, perforations and watermark. Those who collect stamps illustrating some pet subject can go further with advantage by the inclusion of pictures that are associated with the subjects of their stamps. Next month I propose to give some illustrations of this.





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Yes, this stamp is **YOURS** for the asking, and **ABSOLUTELY FREE**. We will send you this Air Mail stamp of far away **CHINA**, which is valuable and shows an Aeroplane in flight over the famous **Great Wall of China**, **ABSOLUTELY FREE**. You get this most interesting and beautiful stamp by just writing to us and asking for our Free Chinese Air Mail Stamp. You must send us 3d. in stamps for our postages, and ask to see a selection of our stamps on approval. Write now, before you forget and miss this wonderful offer which will improve your collection.

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1d. ea.: 59, 60, 75, 76, 84, 85, 88, 89, 91, 92, 111*, 111, 114, 115, 119-125, 148-161, 167, 168, 172-175, 197, 201-203, 206-212, 214, 232-235, 247-252, 538-543, 549, 550, 556, 557, 559, 560, 561, 566, 567, 576-586, 598, 609*, 609, 611, 612, 613, 626. 2d. ea.: 94, 110*, 127, 163, 171, 185, 186, 192, 200, 213, 236b, 237, 242, 243, 253, 254, 255, 256, 259, 265, 267, 269, 270, 273, 531, 544, 562, 563, 564, 565, 574, 597, 610, 615, 617, 630a. 3d. ea.: 95, 103, 104, 112*, 117, 126, 128, 129, 204, 228, 240, 241, 257, 269a, 275, 529, 532, 537a*, 589a, 591, 606, 611*, 612*, 628*. 4d. ea.: 69, 71, 176, 180, 183, 198, 227, 238, 258, 272, 527, 546, 584*, 587, 588, 647*, 650. 6d. ea.: 102, 136, 205, 215, 226, 260, 524, 548, 606*. 9d. ea.: 62, 63, 81, 87, 90*, 99, 106, 134, 220, 520, 530, 534, 605*, 606*, 608*, 632*. 1/- ea.: 214* (no gum), 222, 244, 568, 589a*, 618. 1/3 ea.: 135, 165*, 221, 223, 229, 261, 616*. 1/6 ea.: 79, 97, 101, 216, 230, 245. 2/6 ea.: 170*, 224, 535*, 617*. 3/- ea.: 246, 277, 599*.

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For other Stamp Advertisements see also pages 40 and xi.

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A fine unused set of New Zealand Victory stamps showing Lake Mathieson, King Geo. VI and Parliament, and St. Paul's Cathedral with the Union Jack in the background, a quotation from one of Mr. Churchill's great Battle of Britain speeches, and the V sign, designs truly symbolising the sources of Peace, Strength, and Victory, sent free to all applicants for approvals enclosing 2½d. postage.

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Stamp Gossip and Notes on New Issues

By F. E. Metcalfe

IT only seems the other day, certainly nothing like as long as a year, since we last illustrated "Health" stamps from New Zealand, and here we are with the pair for 1946. Taken all round these stamps are certainly the most popular that are issued in the British Empire. We welcome them, for not only do our collectors get cheap and attractive stamps for their collections, but valuable sums of money are raised each year for worthy charities. This year's design



speaks for itself, so all we need do is to illustrate one of the two stamps.

The Australian commemorative set of three stamps illustrated last month

is in honour of that great Scotsman Sir Thomas L. Mitchell, who was born north of the Tweed as long ago as 1792. After fighting in the Peninsular War he went to Australia and became Surveyor-General in 1828. Then he took part in a good deal of exploration and penetrated the south-eastern part of the continent, an expedition that gave him greatest fame. He died at the comparatively early age of 62, in Sydney, and so valuable was his work to Australians that a century after his great feat he is honoured by a special set of stamps. These have been printed in Australia at the Government printing works.

Of course the U.S.A. is again in the news; this time with a stamp issued to commemorate the entry into Santa Fé of Stephen Watts Kearny. The stamp is recess printed in an attractive plum shade. Owing to the embargo on the barter of mint stamps, supplies will not be too plentiful over here, though most collectors should be able to get a copy.

The older type of collector often accuses his modern counterpart of being too concerned with the financial side of his hobby; actually of course, there is not the slightest justification for such a charge. It is true that many of the younger collectors spend a good deal more on stamps than was the case years ago, and it is natural that they take care to see that they get good value for their money, but in no sense are they to be blamed for this. In fact, they would be very foolish not to take care about what they pay for stamps, and it is becoming more evident every day that collectors who spend more money than they can afford to throw away on a hobby will have to take more care than ever in future, for unless they collect our own colonial stamps—these are safe enough, old or new—they are likely to buy stamps that later on may go down very much in price.



This applies particularly to new European issues, which are being poured out of the presses. Austria, France, Belgium and other countries are working overtime on their new and, alas, attractive stamps, and there is bound to be a show down sometime soon. Collectors who stick to British Empire stamps are going to save themselves a lot of trouble later on.

Both South Africa and Australia have announced that in future local artists will get a chance to submit designs for any new stamps to be. This may seem a very sensible course to take, but it rarely works out well, for it is one thing to be able to paint a picture and quite another thing to design a postage stamp. The job is far better left to the professionals who work for the various stamp printers. They know their medium, and amateurs do not. The last commemorative set of Jamaica is a case in point. The set could scarcely have been poorer, and this was the result of public competition. Many other instances could be given.

By the time this article appears the Crown Colony "Victory" stamps should be out, except perhaps the set for Southern Rhodesia. We were informed officially that this was not to appear until the end of the year at the earliest. These stamps were to have finished at the end of the year, but owing to the late appearance of some of the sets it has been announced that their sale can be continued until March. This won't make a great deal of difference, however, and the set should prove well worth the money, particularly as competition has made dealers offer them at such a

small premium over face. It will be unwise to buy more than are needed for one's collection.

Collectors were getting very bored by the same old design of all the Crown Colony "Victory" stamps, but the discovery of two perforations for several of the colonies brought back a good deal of interest. It is too early to say just which will be the good perfs. but at any rate the fact that there are more than one is good enough to spice up a rather dull lot of stamps.

Last Christmas it was almost impossible to get a stamp album, but now that their manufacture is again permitted, small supplies are again available in stamp dealers' shops. It will be very unwise to wait until the last moment before trying to buy, for at best there will not be enough to go round. Just another point—go to a stamp dealer for your album; there you will find someone who is an expert and the albums he has for sale will be all right for the job. It is the same with stamps. A stamp dealer knows their value and charges accordingly, whereas some who handle stamps offer them often at utterly inflated prices. In one instance known to the writer mint stamps, all the same, offered at 5/- each were being sold by a pukka stamp dealer, within a stone's throw, at 1/6 a copy. "Nuff sed."

And to wind up, our last illustrations this month show the latest "overprinted" stamp of Egypt, issued to commemorate their aviation congress, together with a new duty 10d. value from the Bahamas.



Competitions! Open To All Readers

Prize-winning entries in "M.M." competitions become the property of Meccano Ltd. Unsuccessful entries in photographic, drawing and similar contests will be returned if suitable stamped addressed envelopes or wrappers are enclosed with them.

Which Were the Most Popular Covers in 1946?



Readers thoroughly enjoy our annual Cover Voting Contest, and this month we ask them to tell us which of the 1946 covers they like best. These covers are illustrated above. The reproductions do not give any idea of the brilliancy and colour of the originals, but they will serve as a guide to competitors.

All that is necessary in this contest is that each entrant shall state on a postcard: A, the cover that he likes best; and B, what he thinks will be the order of popularity as decided by the votes of competitors. The covers must be referred to by the

names of the months in which they appeared, and it is not necessary that a competitor's own favourite should be at the head of list B.

The names and addresses of entrants must be written on their postcards, which should be addressed to "1946 Cover Voting Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Home and Overseas readers, with prizes in each of 21/-, 10/6 and 5/- respectively for the best entries. Closing dates: Home Section, 28th February; Overseas Section, 30th August.

What Tunnels Are These?

Tunnels are invariably of great interest to the railway-minded readers of the "M.M." For our competition this month we have chosen the names of 14 of them, all well known, and we have mixed up the letters of these names so that they form queer jumbles. All we ask readers to do is to rearrange the letters in their correct order and state the railway on which each tunnel is situated.

To make it clear what is required we may take the first jumbled name "Soemglierd." This will be found to be "Gildersome," the name of an L.M.S. tunnel.

Here are the 14 jumbled tunnel names:

- | | |
|----------------|-------------------|
| 1. Soemglierd; | 8. Ncrouwb; |
| 2. Lawhtlebi; | 9. Rtoomoda; |
| 3. Yqureuebns; | 10. Ycbaste; |
| 4. Dmriodf; | 11. Hsghuuogrob; |
| 5. Msayhdne; | 12. Dsoaolwl; |
| 6. Dsotor; | 13. Yheald Dowo; |
| 7. Ardhdon; | 14. Spnaors Krco. |

When all the names of tunnels have been discovered, the resulting list should be placed in an envelope addressed to "January Tunnels Competition, Meccano Magazine, Binns Road, Liverpool 13" and posted to reach here not later than 28th February for Home readers, and 30th August for Overseas readers.

In each section, Home and Overseas, prizes of 21/-, 15/- and 10/6 will be awarded for the best entries in

order of merit, with Consolation Prizes for other deserving efforts. In the event of a tie for any prize, the neatness and originality of the entries concerned will be taken into account.

January Photographic Contest

This month's photographic contest is the 1st of our 1947 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions—1, that the photograph must have been taken by the competitor, and 2, that on the back of the print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "January Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13." There will be separate sections for Overseas readers, and in each section prizes of 15/- and 7/6 will be awarded. Closing dates: Home Section, 31st January; Overseas Section, 31st July.

ERROR IN JIG-SAW CONTEST

We are sorry to say that an error appeared in our December Jig-Saw Puzzle. One of the fragments, from an advertisement of D. G. Campbell, did not appear in the December issue but in November. This fragment will be ignored in judging entries.

Competition Results and Solutions

MAY PHOTOGRAPHIC CONTEST

Home Section—1st Prizes, Section A: R. Wrigley, Clitheroe; Section B: J. T. Lewis, Cardiff. 2nd Prizes, Section A: P. Thompson, Leicester; Section B: S. Twycross, Nottingham. Consolation Prizes: N. Nesbitt, Westcliff-on-Sea; D. H. Bacon, Oxford; J. W. Waddington, Derby; J. C. H. Cunningham, Harrow-on-the-Hill; S. S. Pethybridge, Newton Abbot; Rev. P. McArdle, Chesterfield; N. V. Salt, Manchester 20.



"A Young Starling." Prize-winning photograph in the May Photographic Contest, Section A. Taken by R. Wrigley, Clitheroe.

MAY HIDDEN LOCOMOTIVES CONTEST

1. L.M.S. (Ex L. & Y.) Class 7F 0-8-0. 2. L.M.S. (Ex L.N.W.R.) "Prince of Wales" Class 4-6-0. 3. L.M.S. Standard 2-6-0 Class 5F. 4. L.M.S. "Royal Scot" Class 4-6-0. 5. L.M.S. (Ex L.N.W.R.) "Coal Engine," 0-6-0 Class 2F.

Home Section—1st Prize: D. S. Popplewell, Wakefield. 2nd Prize: J. Howorth, Burnley. 3rd Prize: J. Adams, Keighley. Consolation Prizes: G. H. Brown, Huddersfield; C. Hood, Rugby; J. L. Makin, Allestree; I. C. Mead, Bedford.

MAY FIGUREWORD CONTEST

Home Section—1st Prize: G. Taylor, Derby. 2nd Prize: T. Ward, Drogheda. 3rd Prize: M. Skelding, Birmingham. Consolation Prizes: C. E. Wrayford, Bovey Tracey; B. Turner, Penarth.

APRIL PHOTOGRAPHIC CONTEST

Home Section—1st Prize, Section A: G. Gemmill, Burnley. 2nd Prize, Section A: P. Milne, Whyteleafe. 1st Prize, Section B: N. Boyd-Maunsell, Oxford. 2nd Prize, Section B: G. Evens, Neath, Glam. Consolation Prizes: T. Jones, Nr. Neath, Glam.; N. T. Boulsover, Bakewell; Mrs. M. B. Aylott, Letchworth; F. Barr, Birkenhead; Miss B. Davies, Seaford; P. Dixon-Smith, Braintree; P. Norris, Burton-on-Trent; P. F. Opher, Bexley Heath; C. E. Wood, Wallington.

Overseas Section—1st Prizes, Section A: B. J. Smith, Auckland, N.Z.; Section B: J. S. Bell, Vancouver, Canada. 2nd Prizes, Section A: G. Mertagh, Bombay, India; Section B: J. F. Petrie, Invercargill, N.Z. Consolation Prizes: Pablo Giese, Buenos Aires, Argentina; R. W. Wilson, Cape, S.A.; J. C. Lapira, Malta, G.C.

MARCH PHOTOGRAPHIC CONTEST

Home Section—1st Prizes, Section A: R. Wrigley, Clitheroe; Section B: S. Twycross, Nottingham. 2nd Prizes, Section A: Rev. R. McArdle, Nr. Chesterfield; Section B: A. Smith, Abergale. Consolation Prizes: P. Milne, Whyteleafe; T. Jones, Nr. Neath; B. Cleave-

land, Teddington; J. Watt, Aberdeen; J. House, Glasgow S.4; J. P. Hatchby, Nr. Sheffield.

Overseas Section—1st Prizes, Section A: K. W. Bennett, Madras, India; Section B: J. S. Craig, Cairo, Egypt. 2nd Prizes, Section A: J. Peters, Brisbane, Australia; Section B: D. B. Selby, Quetta, India. Consolation Prizes: N. Candish, Christchurch, N.Z.

MARCH CODE CROSSWORD

Nearly all entries our Readers submitted had the correct solution for this contest; therefore neatness and novelty were decisive in the selection of prize-winners.

Code: H G J T B W N U F X

Alphabet: A B C D E G H I L M

Code: V Y Z D O E K Q S C

Alphabet: N O P R S T U V X Y

Home Section—1st Prize: T. Hill, Bolton. 2nd Prize: P. W. Ward, Rugby. 3rd Prize: G. Roberts, Liverpool 11. Consolation Prizes: D. E. Percival, London N.3; J. Owen-Smith, Swansea; A. Smedley, Swinton; D. G. Scales, Wembley; H. Poyner, Leicester.

Overseas Section—1st Prize: S. F. Noble, Invercargill, N.Z. 2nd Prize: N. A. Macdougall, Victoria, Canada. 3rd Prize: G. B. Murray, Auckland, N.Z. Consolation Prizes: G. T. Dey, Hamilton, N.Z.; Antonio Sarmiento, Lisboa, Portugal; B. Lathlean, Westmead, N.S.W.

MARCH HISTORIC LOCOMOTIVES CONTEST

1. Rocket. 2. Comet. 3. Jenny Lind. 4. Lion. 5. Puffing Billy. 6. Locomotion. 7. Columbine. 8. Cornwall. 9. Gladstone. 10. City of Truro. 11. William Galloway. 12. De Witt Clinton. 13. Stourbridge Lion. 14. Der Adler. 15. Josephine. 16. General. 17. Aerolite. 18. Lord of the Isles. 19. Cardean. 20. Marmora.

Home Section—1st Prize: F. Mills, Kearsley. 2nd Prize: A. E. H. Irwin, Co. Cork. 3rd Prize: G. H. Greenslade, Haslemere. Consolation Prizes: J. Williamson, Bedford; A. J. S. Patterson, Bearsden, Glasgow.

Overseas Section—1st Prize: D. J. White, Christchurch, N.Z. 2nd Prize: I. T. G. Johnstone, Wellington, N.Z. 3rd Prize: Miss E. V. Gnanadurai, Trichinopoly, S. India. Consolation Prize: Pablo Giese, Argentina.

FEBRUARY PHOTOGRAPHIC CONTEST

Home Section—1st Prizes, Section A: F. Barr, Birkenhead; Section B: M. Gee, Chippenham. 2nd Prizes, Section A: T. Elphick, Hastings; Section B: T. R. Bird, Great Yarmouth. Consolation Prizes: B. M. Hill, Lurgan, N.I.; R. Wrigley, Clitheroe; P. A. Green, Wolverhampton; D. K. Elliot, Portaferry, N.I.

Overseas Section—1st Prizes, Section A: N. Tasker, East Malvern, Australia; Section B: E. C. Stonyer, Meadowbank, N.S.W. 2nd Prizes, Section A: L. W. Humm, Geraldine, N.Z.; Section B: A. Benjamin, Germiston, S.A. Consolation Prize: J. Lipira, Misida, Malta, G.C.

FEBRUARY "DO YOU KNOW" CONTEST

1. When a banking engine is in rear of train. 2. Severn Tunnel, 4 miles 628 yards. 3. St. Pancras, L.M.S. 4. Manchester South Junction & Altrincham. 5. G.W.R. 1908 "The Great Bear." 6. Victoria-Newhaven Boat Train. S.R. 7. Freight train fitted with continuous brakes. 8. L.M.S. No. 14010, ex-Caledonian No. 123, on Perth-Dundee line. 9. Electric current is passed through rails; the circuit is completed by a train passing over, thus working indicators to remind signalman of the presence of train and locking levers to prevent another train entering section until it is clear. 10. Southern Railway.

Home Section—1st Prize: B. E. Timmins, Nr. Stourbridge. 2nd Prize: G. E. Lawrence, Bristol 4. 3rd Prize: R. P. Walford, Newton Abbot. Consolation Prizes: E. G. Liddell, Effingham; W. Lobb, Nr. Oldham; W. T. Barrett, Birmingham 30.

Overseas Section—1st Prize: J. A. Markham, Windsor, Canada. 2nd Prize: P. Giese, Buenos Aires, Argentina. 3rd Prize: I. T. G. Johnstone, Wellington, N.Z.

A Railwayman Abroad—(Continued from page 3)

these trains, but it was not long before the Nord 4-6-2s and 4-6-0s—the latter very handsome machines with outside-sprung bogies—came into the picture, with corresponding benefits to punctuality. Later, the British military trains were routed via the direct line which passes outside Lille station, and Tournai became the engine exchange-point between the French and Belgians.

Concluding these notes on locomotive running in the Liberated Countries, with an example of French performance, Pacific No. 231.C.63 was recorded hauling a load of 180 tons (German stock) out of Calais en route to Hamburg. On the climb from Calais out to Pont d'Ardres (7.7 miles in 19 min.) speed fell from 36 to 30 m.p.h. after a severe slack through Watten 53 m.p.h. was reached before St. Omer (25.2 miles in 44 min.) and 52 m.p.h. re-attained before coming to a signal stop just beyond Hazebrouck, 39 miles in 64½ min. The ensuing 25.4 miles from the restart to passing Lille La Madeleine were run in 36 min., top speed being 53 m.p.h. prior to a severe bridge slack at Armentieres.

The next article in this series will deal with railway conditions in Germany.

Dare-devil Feats—(Continued from page 15)

different words at the same time, two with each hand and the fifth with a pencil held in her mouth. She could write a letter in Spanish with her left hand, and a translation of the same letter into French with her right hand at the same time, while reading aloud the English translation of the letter. She could write two different sentences with her hands, while writing a third one backward with a pencil guided by her mouth. Then she would sit down at the piano and play one song with her right hand, and another with her left hand, singing a third song simultaneously. Her most effective number was to have her eyes blindfolded, play a song with one hand and write a sentence backward with the other, at the same time reciting a poem in a foreign language.

Although rope walkers do amazing and much more difficult stunts nowadays than many of those in the past have done, no performer has yet been able to surpass the trick of a rope-walker in Venice in the 16th century, who is recorded to have walked upward on a rope stretched between a platform floating on the waters of the lagoon and the top of the Campanile, the belfry of St. Mark's Church. This event was judged by contemporaries to be so outstanding that a pictorial record of it exists showing the rope-walker in mid-air and the population of Venice staring agape below. No one has ever attempted to imitate this dare-devil, and the individual achievements of this man and of other personalities of the show ring remain unequalled and unsurpassed in spite of the technical development of recent years.

To-morrow's Fighters—(Continued from page 8)

the resulting expansion releases the valves, which are then re-opened by the ejection of the gases at the rear, the cycle recurring about 2,800 times a minute. It is a primitive but very effective form of propulsion, the engines are cheap to build and give a quite good power output. For instance, the Argus gave the "Doodlebug" a speed of nearly 400 m.p.h.

For really high speeds the athodyd has even more to offer and becomes even simpler, because the tremendous pressure of air ramming into the front of the unit dispenses with the need for valves. The true athodyd duct is in fact merely a metal tube, open at both ends, in which the air is compressed simply by the high forward speed before being mixed with the fuel and ignited.

The Germans had gone a long way towards developing practical athodyds and were working on several projects to use them, typical of which is the Focke-Wulf fighter illustrated on page 7. It was designed

to be accelerated up to 200 m.p.h. by a 6,600 lb. thrust Walter rocket unit, after which the two 4.4 ft. dia. ducts were to take over. This machine was expected to have a speed of 680 m.p.h. An even more daring project was the Focke-Wulf high-speed helicopter powered by an athodyd at the end of each of its three rotors. It was revolutionary in that the rotors were designed to turn axially about the fuselage instead of above it. The tail fins each contained an undercarriage wheel, and for take-off the helicopter was intended to stand vertically on these wheels, while the rotors were started by rockets. Then the athodyds would have been started up and the machine would have risen vertically at 75 m.p.h. At combat height it was supposed to flatten out and would then have a speed of about 620 m.p.h.; which is about six times as fast as any conventional helicopter.

Perhaps the most incredible German project of all was another of Lippisch's tailless designs, illustrated on page 8. Designed round a single athodyd engine, the main component of which was a block of carbon, it was designed for speeds of up to 1,700 m.p.h. The pilot lay prone in the cockpit forward of the fin, which contained a fuel tank. For take-off the carbon was to be heated white-hot in a furnace, then inserted into a venturi duct in the fuselage, immediately after which the machine was to be shot off by rockets. Once in the air, the fighter would be kept going at tremendous speed solely by air rushing past the hot carbon in the venturi and ejected from the tail, the carbon being kept white-hot by a spray of fuel from the tank in the fin.

At the moment no athodyd-powered fighter has flown and the "sonic wall" remains a formidable and unknown barrier. Whether there is a future for fighter aircraft, or whether they will be superseded by pilotless guided missiles, depends on whether a few brave test pilots can smash through it in the coming months.

Anchor Line War Losses—(Continued from page 21)

Mediterranean, this Anchor liner was attacked by Heinkel III and Junkers 88 torpedo bombers. The aircraft were met by heavy and concentrated fire from the ship's anti-aircraft guns, and many tracers were seen to find their mark. One Heinkel III, with her port engine on fire, crashed on the horizon, the bright red flash being followed by a tell-tale column of black smoke.

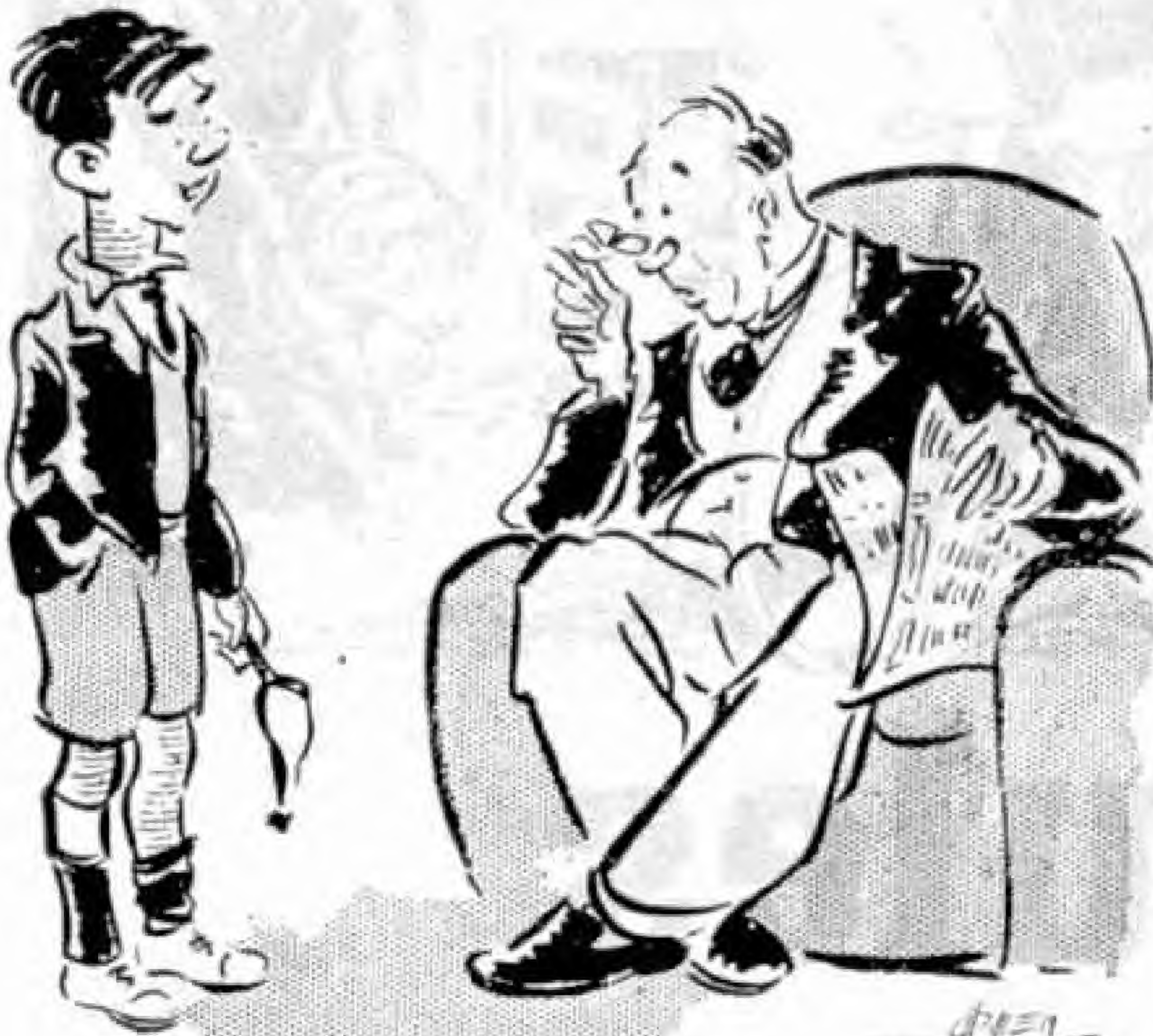
The attacks were continued until 1.50 a.m. the following day and were renewed again at 4.00 a.m., several torpedoes being dropped which caused the "Cameronia" to take violent and successful evasive action. More attacks followed at 6.00 a.m. and during one of these a torpedo struck the starboard side of the ship aft No. 7 hold. The ship was stopped and an examination was quickly carried out, following which the vessel proceeded at slow speed towards Bougie, arriving in the outer harbour at 1.30 p.m. Further examination showed that a hole, which was about 24 ft. long by 15 ft. wide, had been blown in the ship's side below the water-line. By using the port engine only, and with the assistance of a tug, the "Cameronia" made the passage from Bougie to Gibraltar, by way of Algiers. Temporary repairs were carried out at Gib., and these enabled the crippled liner to proceed, under her own steam, to a port in the British Isles.

Deep Channels—(Continued from page 29)

reclamation scheme that is going on, or it can be taken out to sea and dumped. On this occasion the former course was taken, and we shortly tied up alongside the "Lady Thompson," which is really a floating pumping station, permanently anchored by the east bank. Water was again mixed with the sand in the hopper to make it flow, and it was pumped over the side into a barge, from which it was pumped through 6,000 ft. of pipe line to the site of the reclamation scheme.

Fireside Fun

"Your hair wants cutting badly, sir."
 "No, it doesn't. It wants cutting well. You cut it badly last time."



"Oh, I'm managing to keep my head above water, Uncle."

"Yes, I can see that by the colour of your neck!"

"I want a thermometer. How much is this one?"

"Ten shillings, sir."

"Ten shillings! I got one like it for five last week."

"What time did you buy it, sir?"

"I came in just as you opened in the morning."

"Ah, that explains it, sir. You see it is 12.0 o'clock now, and thermometers are always higher at noon."

"Now, children, many plants and flowers have animals mentioned in their names. Catmint is one of them. Can you tell me another?"

"Yes, miss, dog-rose."

"Good. Now another one."

"Please, miss, collie flower."



"It's quite clear you've never seen a shark."

"You're right, guv'nor. But after all some of those Academy chaps paint angels, you know!"

BRAIN TEASERS BATH TIME QUERY

Of two baths, one supplied by a 6 in. pipe and the other by two 3 in. pipes, which would be filled the more quickly, with the taps turned on at full in each case?
 R.W.F.

NO CHANGE HERE!

Suppose you were asked for change for a 10/- note. What is the largest amount of money in silver coins that you could have in your pocket if you were unable to do as you were asked? Five and four shilling pieces are not allowed in this puzzle.

A SQUARE DEAL

A friend knowing of my interest in puzzles said to me the other day: "AB multiplied by itself gives CDCB, and there's nothing in it? What numbers do these represent?"

On first looking into the puzzle I thought that very definitely there was something in it, but what he meant suddenly occurred to me and then I soon found the numbers required. Can you do this?

YOU KNOW THESE NAMES WELL

Here are the names, well disguised, of four famous men: OAYYDBG; LNIFOIBLDB; EOPJEOQWW; LOAUILFIAJI. What are the names? A further clue is that the four are or were eminent in connection with sport, railway construction, politics and the stage respectively.
 B.I.N.



"Left leg raise, I said! Who's the wise guy holding up both legs?"

SOLUTIONS TO LAST MONTH'S PUZZLES

The least number of moves required to bring about the change in positions in the first puzzle last month is 15, and they are as follows: 3 to D; 4 to C; 5 to E; 3 to F; 2 to D; 1 to B; 4 to A; 5 to C; 6 to E; 3 to G; 2 to F; 1 to D; 5 to B; 6 to C; and 1 to E.

The sum divided between eight people in the second puzzle is £26/19/4, each receiving £3/7/5.

In last month's "M.M." the solution of the third puzzle of the previous month was given as "SLEEPLESSNESS IS A DISASTROUS DISEASE." This should have been "SLEEPLESSNESS IS A DISTRESSING DISEASE." I apologise to readers for this distressing disaster and thank those who have pointed out the error.

THIS MONTH'S HOWLER

A man who makes spectacles is called an optimist.

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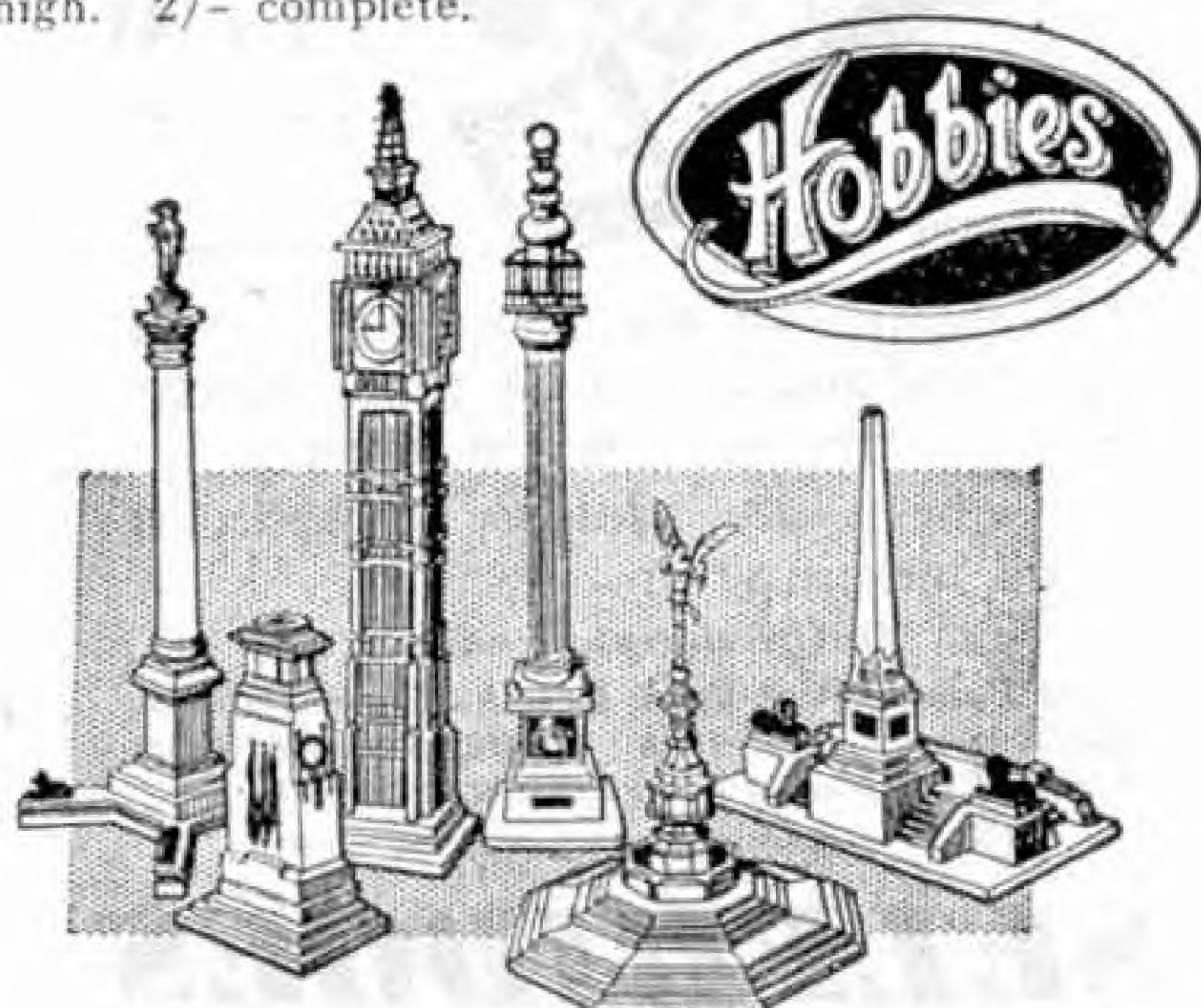
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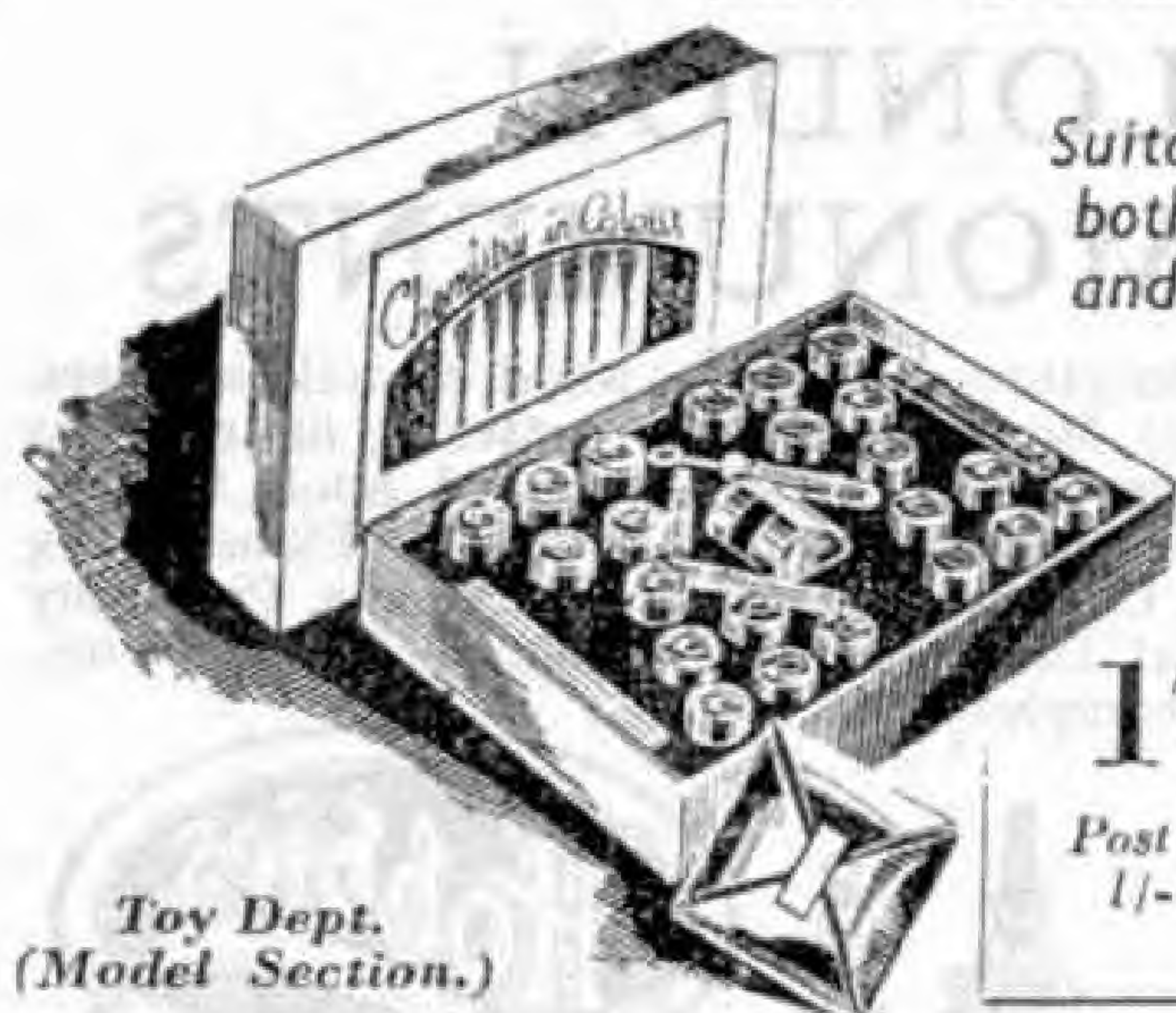
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Diesel Engineering	Steam Engineering
Draughtsmanship	Structural Steelwork
(State which branch)	Surveying
Drawing Office Practice	(State which branch)
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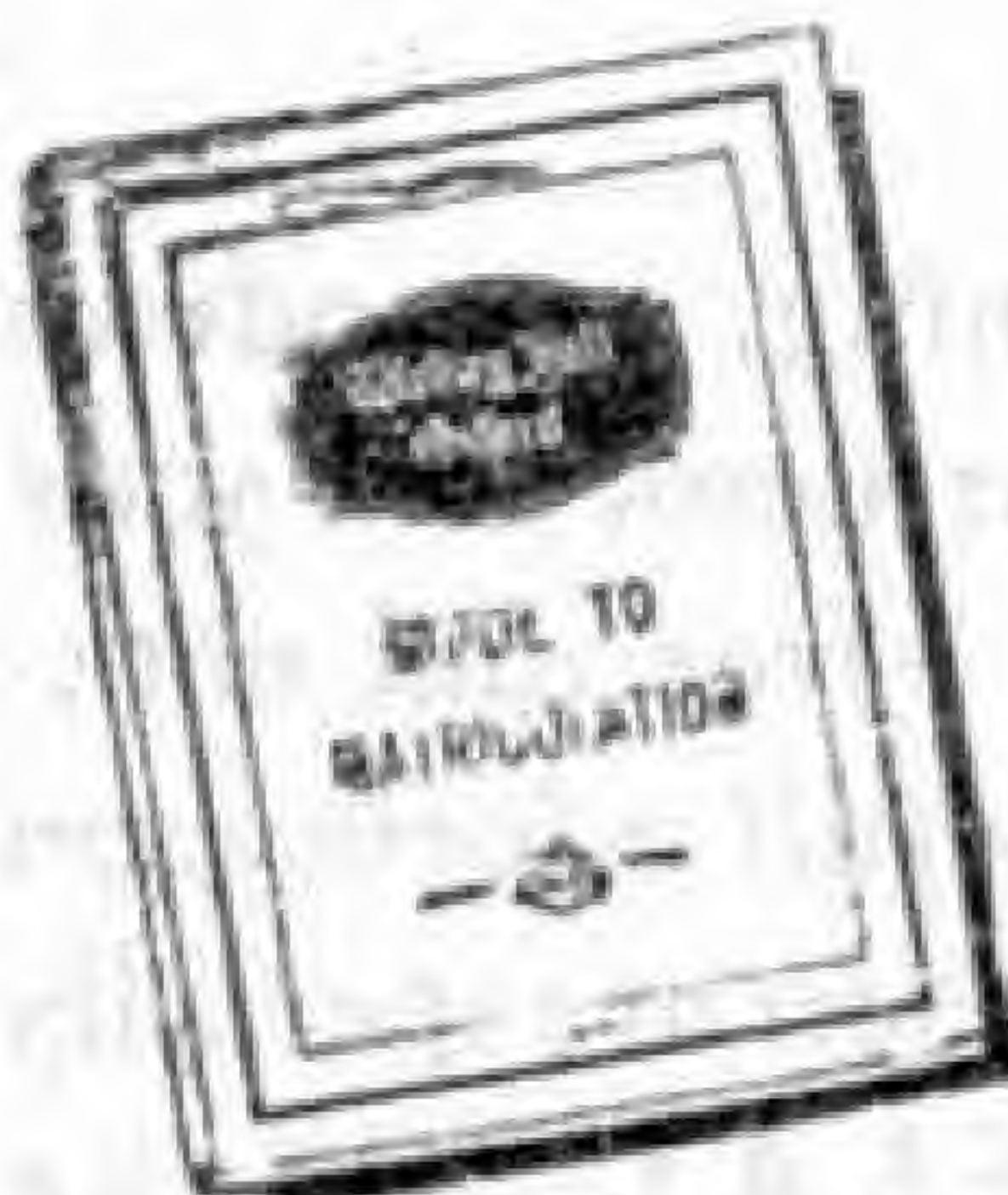
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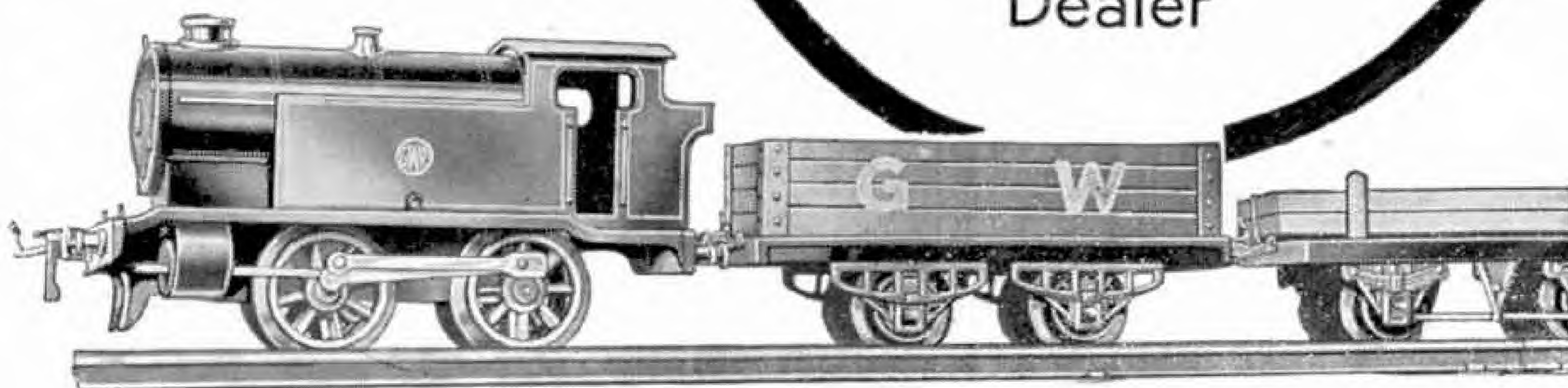
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